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THE BUILDER & WOOD WORKER

FOR ARCHITECTS, CABINET MAKERS, STAIR BUILDERS, CARPENTERS, CAR BUILDERS, &c. &c.

CHARLES D. LAKEY, Publisher. | FRED. T. HODGSON, Editor.

NEW YORK, JANUARY, 1882.

176 BROADWAY.

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VOLUME XVIII. NUMBER 1.

CONTENTS.

ILLUSTRATIONS.

The Carpenter Organ Actions

are complete in every respect, including everything that goes to make up a perfect organ, except the Case or Cabinet, which Contractors, Builders, and Amateurs can make themselves.

SPECIAL OFFER TO DESIGNERS—To the one sending me two approved original designs of Organ Case, I will present one of my superb **Organ Actions**, complete in every respect. Designs not accepted will be returned to sender. For particulars address,

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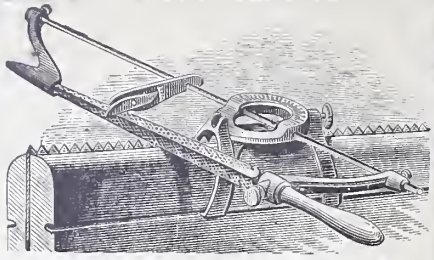

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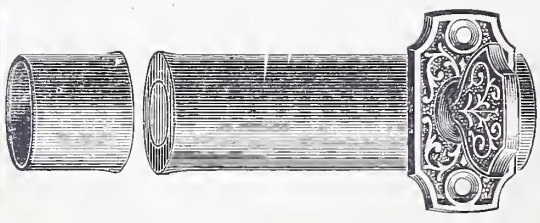

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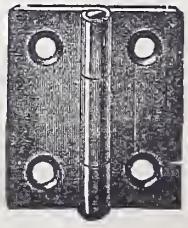

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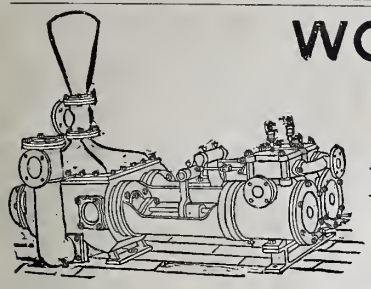

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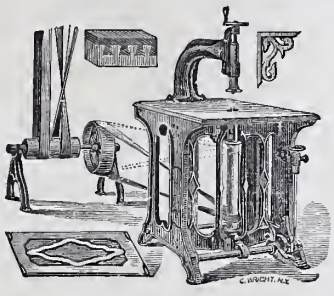

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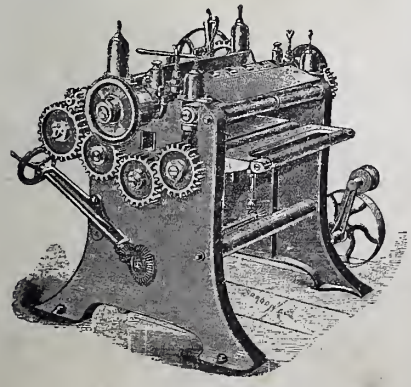

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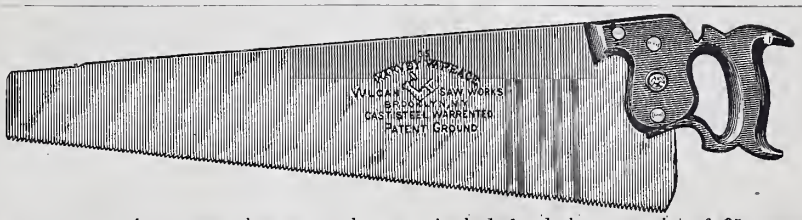

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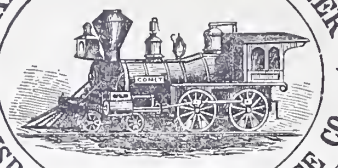


J. M. ALLEN, President.
W. B. FRANKLIN, Vice-President.
J. B. PIERCE, Secretary.

HOME
Insurance Company of New York,

OFFICE: No. 135 BROADWAY.

FIFTY-FIRST SEMI-ANNUAL STATEMENT, showing the Condition of the Company on the first day of JANUARY, 1879.

CASH CAPITAL,	$3,000,000 00
Reserve for Re-Insurance,	1,766,771 00
Reserve for Unpaid Losses and all other Claims,	260,092 46
Net Surplus,	1,363,488 94
TOTAL ASSETS,	$6,390,352 40

J. H. WASHBURN, Secretary. CHAS. J. MARTIN, Presid't.
T. B. GREENE, } Ass't-Secs. A. F. WILLMARTH, Vice-P't.
EDW. H. AHERN, } Ass't-Secs. D. A. HEALD, 2d Vice-P't.

THIRTY-FIFTH ANNUAL STATEMENT
OF
THE CONNECTICUT MUTUAL LIFE INSURANCE COMPANY,
OF HARTFORD, CONN.

NET ASSETS, January 1, 1880 ..... $47,116,244 37

RECEIVED IN 1880.

For Premiums	$5,247,282 90	
For Interest and Rents	2,834,132 70	
Profit and Loss	68,644 00	
		8,150,059 60
		$55,266,303, 97

DISBURSED IN 1880.

TO POLICY HOLDERS:

For Claims by death and matured endowments	$3,685,146 27	
Surplus returned to Policy holders	1,798,654 86	
Lapsed and surrendered Policies	929,894 25	
TOTAL TO POLICY HOLDERS		$6,413,695 38

EXPENSES:

Commissions to Agents	$310,974 81	
Salaries of Officers, Clerks, and all others employed on salary	98,936, 54	
Medical Examiners' fees	11,811, 75	
Printing, Advertising, Legal, Real Estate, and all other expenses	206,048 93	
	$627,772 03	
TAXES	391,207 86	
		$7,432,675 27
BALANCE NET ASSETS, December 31, 1880		$47,833,628 70

SCHEDULE OF ASSETS.

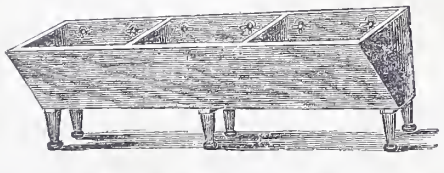
Loans upon Real Estate, first lien		$18,718,385 49
Loans upon Stocks and Bonds		31,553 28
Premium notes on Policies in force		3,702,156 82
Cost of Real Estate owned by the Company		12,622,944 42
Cost of United States Registered Bonds		5,004,858 46
Cost of State Bonds		619,900 00
Cost of City Bonds		2,583,506 88
Cost of other Bonds		1,065,875 00
Cost of Bank Stock		110,194 00
Cost of Railroad Stock		26,000 00
Cash in Bank		3,286,819 32
Balance due from agents, secured		61,435 03
		$47,833,628 70
ADD:		
Interest, due and accrued	$1,159,251 12	
Rents accrued	30,688 68	
Market value of Stocks and Bonds over cost	430,133 54	
Net premiums in course of collection....NONE...		
Net deferred quarterly and semi-annual premiums	38,927, 34	
		$1,659,000 68
GROSS ASSETS, December 31, 1880		$49,492,629 38
LIABILITIES:		
Amount required to reinsure all outstanding policies, net, assuming 4 per cent. interest	$45,006,472 00	
All other liabilities	1,135,001 93	
		$46,141,473 93
SURPLUS, by Connecticut Standard, 4 per cent.		$3,351,155 45
SURPLUS, by New York Standard, 4½ per cent., about		$6,500,000 00

Ratio of expense of management to receipts in 1880, - - - - 7.7 per cent.
Policies in force December 31, 1880, 64,343, insuring, - - - $162,105,367 00.

JACOB L. GREENE, President.
JOHN M. TAYLOR, *Secretary.* D. H. WELLS, *Assistant Secretary.*

WHY USE WOODEN STATIONARY WASH TUBS?

SOAP-STONE Cost about the same And LAST ten times as long.



All work warranted.

J. H. SERENES' Vermont Soap-Stone Works,
4 & 6 PECK SLIP.
SHOW ROOMS:
310 PEARL STREET.

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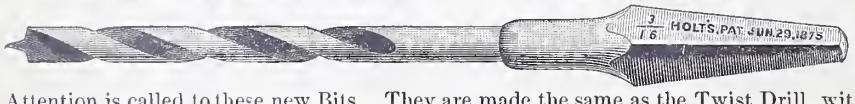

Attention is called to these new Bits. They are made the same as the Twist Drill, with the addition of the ***Conical Reamer Point.*** It is this peculiar point that adds so much value to the tool in keeping it *Central* and *Steady*—acting as a guide to the cutting lips, and thus relieving the sides or surface of the blade from the friction felt with ordinary bits.

These Bits are *ground* on *centres;* they bore *straight,* never *splitting* the *wood,* and work equally well in all kinds of wood, knots not excepted.

They are made in sizes $\frac{3}{32}$ in. $\frac{4}{32}$, $\frac{5}{32}$, $\frac{6}{32}$, $\frac{7}{32}$, $\frac{8}{32}$ in., and are put up in boxes of one dozen each; also in sets of half dozen, one of each size.

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New York Office: 45 William Street.

HOME OFFICE STATEMENT, Jan. 1, 1880.

Fire Assets	$11,109,626 21
Fire Liabilities	3,944,358 23
Surplus as regards Policy holders	$7,165,267 98

STATEMENT OF U. S. BRANCH, Jan. 1, 1881

Total Assets in U. S.	$4,462,065 26
Total Liabilities, including reinsurance	2,647,030 22
Surplus	$1,815,035 04

J. E. PULSFORD, Resident Manager.

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Clocks and Bronzes, Ornamental Metal Work, etc.,

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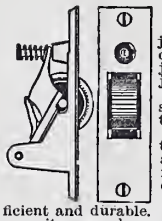
Crystalline and 13th Century Antique Glass a Specialty.

DECORATIONS IN PAPIER-MACHE, CEMENTS, ETC.



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INSTANTLY ADJUSTABLE and readjustable after being applied. (A roller cam in principle controlled by an adjusting screw operating a steel adjusting spring.)

Now made for medium and light sash, but capable of being made to retain tons.

INVALUABLE for all windows. As the sash is not held by spring pressure alone, there is no sagging back after raising, or giving out by the settling of the spring.

Stands alone in its work—simple, efficient and durable. An acquaintance with its merits insures its general use. Price $1 per window, discount to the trade. Address Robt. B. Hugunin (Sole Maker), P. O. Box 523, Hartford, Ct., U. S. A.

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COPPER, IRON & STEEL

CHAINS.

Strength from 25 lbs. to 500 lbs. For suspending Window Sashes, Doors, Gates, and for Machinery purposes, these chains, used as directed, will be warranted for years

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NEW ENGLAND

MUTUAL

LIFE INSURANCE CO.

OF BOSTON.

Assets, ...	$14,961,820.85
Liabilities, ...	13,110,495.31
Total Surplus,	$1,851,325.54

BENJ. F. STEVENS, President.

JOSEPH M. GIBBENS, Secretary.

ESTABLISHED 1845.

Royal Fire Insurance Company

OF LIVERPOOL.

Head Office for Metropolitan District,

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Capital, paid in cash	$1,447,725 00
Reserve for all Fire Liabilities, including Reinsurance	2,703,578 90
Net Surplus	6,313.714 69
Total Fire Assets	$10,465,018 59

U. S. BRANCH.

Assets, Fire ($2,318,411.25) U. S. Government Stocks	$2,703,954 01
Liabilities, including re-insurance	1,479,008 96
Surplus	$1,224,945 05

Fire Risks Written at Current Rates.

Applications for Insurance are invited.

E. F. BEDDALL, Manager.

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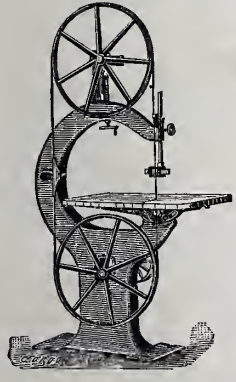
PROVIDENCE, R. I.



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Scientific Designs with Late Improvements.

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Hundreds in use. Send for Catalogue.

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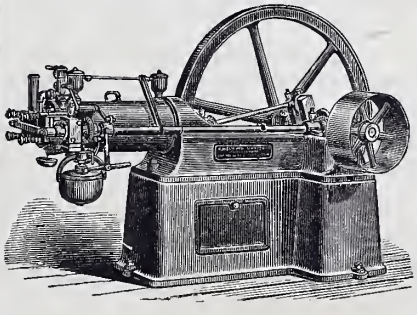

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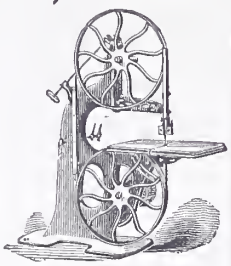

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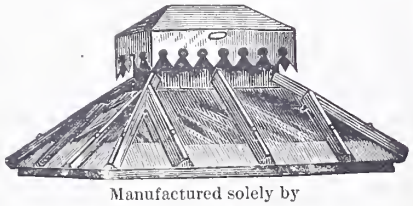

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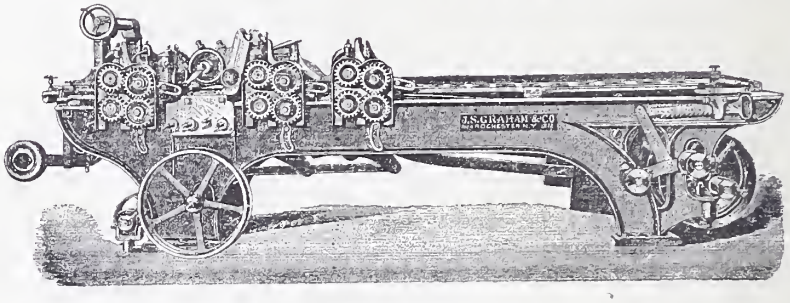

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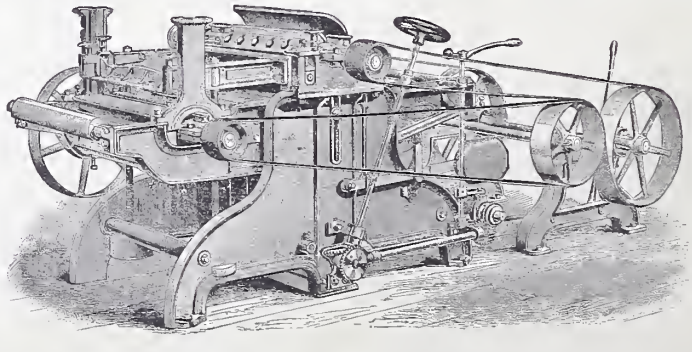

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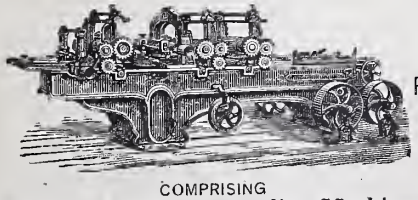

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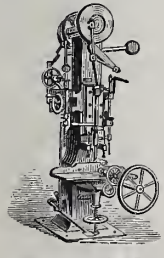

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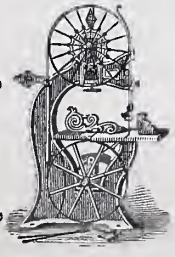

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CONTENTS.

PLATE 1.—Ground Floor plan of Gate Lodge and Entrance Gates. Second Floor plan of Lodge. Elevations of wrought-iron Entrance Gates, Stone Posts and Fence Walls. 3 Drawings.

PLATE 2.—17 Gates, Fences and Posts in Wood. 34 Drawings.

PLATE 3.—21 Inside Doors with casings on each.

PLATE 4.—12 Wood Mantels, with sections and plans. 30 Drawings.

PLATE 5.—6 Book Cases, with elevations and sections. Writing-Desk and Book-Case. Hanging Shelf and 2 Hanging Book-Cases. 7 full size sections of Shelf-Edges. 32 Drawings.

PLATE 6.—10 Gables, and a Hood in Gable, with brackets, etc. 21 Drawings.

PLATE 7.—Plan of large Dry Goods Store, showing position of Shelving, Counters, etc. Elevations and sections of Store Shelving, Counter, Office Front and Desks, Cutting Table, Store Tables. Elevation and detail of Store Front. Half fullsize two angle Sash Bars. 15 Drawings.

PLATE 8.—Two Jacobean Gables, one with oriel bay window, and one with chimney outside. 7 Drawings.

PLATE 9.—2 Front Porches, 5 Verandas, 2 Window or Door Hoods, Step Buttress, 2 Veranda rails. 18 Drawings.

PLATE 10.—9 Gables, 4 Brackets, 2 Barge Ends, 1 Cornice. 16 Drawings.

PLATE 11.—7 Sideboards, elevations, plans and sections. 1 Side Table. 19 Drawings.

PLATE 12.—6 Gables, 1 Ridge Crest, 2 Cornices, 2 Brackets, 1 Barge Foot. 18 Drawings.

PLATE 13.—Back Porch and Entrance Door. Brick and Stone recessed Porch and Front Doors. Front and end view of Veranda, and section of Cornice and Roof. Recessed Balcony over Front Door. Balcony Ceiling. Stone Steps, Buttress and section. Porch Roof section. 11 Drawings.

PLATE 14.—7 Gables and Barge Finish. 2 Gables, with balconies in same. Ventilator Gable. Dormer Gable. 17 Drawings.

PLATE 15.—7 Verandas and Porch Finish. Balcony over Brick Projection. Hanging Balcony Hood, 15 Drawings.

PLATE 16.—12 Gable and Barge Board Finish. 6 Gable and Cornice Brackets. 4 Eave Cornices. 32 Drawings.

PLATE 17.—2 Porches, Dormer, 4 Hoods, Veranda Newel, Step Buttress. 14 Veranda Brackets. 29 Drawings.

PLATE 18.—3 Gables. 8 Drawings.

PLATE 19.—Finish for 14 Staircases. Plan of Staircase with Hall Settee. Motto in Art Glass. Wood Beam Finish, etc. 17 Drawings.

PLATE 20.—Finish for 11 Gables with brackets and sections. 24 Drawings.

PLATE 21.—13 Wood Mantel-Pieces. 32 Drawings.

PLATE 22.—8 Sideboards. Sideboard and Book-Case combined. 22 Drawings.

PLATE 23.—2 Ridge Crests. 7 Gables. Staircase Dormer. 2 Balcony Hoods. Roof Ventilator. 21 Drawings.

PLATE 24.—8 Wood Mantels, elevations, plans and sections. 24 Drawings.

PLATE 25.—15 Figures Hand-Railing Problems, with instructions for working.

PLATE 26.—5 Figures Haud-Railing Problems, with instructions for working.

PLATE 27.—Plan of Bank, showing location of Counters, Desks, Vault, Stairs and Lavatory. Elevations and sections of Bank Counters. Elevation of Partition across Bank. Elevation, section and plan of Counter for Bank and Insurance Office. 2 Side Wall Desks. Wainscot and Door Casing with sections. 3 Wainscot caps. 22 Drawings.

PLATE 28.—Elevation and Sections of Brick and Stone Bank Front, with plan of Front. 7 Brick Cornices and sections. 16 Drawings.

PLATE 29.—Cellar Window and section. Attic Casement. 3 Bay Windows and sections of Jambs, Cornices, Transom and Sills. 2 sections of Water Tables. Belt Course. Window Frame for Brick. Door Frame to Brick Wall. Elevations of Casement Window and 2 Dormer Windows, with sections. 29 Drawings.

PLATE 30.—13 Plaster Cornices, ½ full size. 5 Arch and Angle Molds, ½ full size. 5 Panel Molds, ½ full size. 7 Center-Pieces, suitable for either wood or plaster. 11 Brackets. 2 Niches. 2 Belt Courses, with sections. 65 Drawings.

PLATE 31.—7 Iron Finials and Crests. 5 Terra-Cotta Finials and Ridge Crests. 6 Wood Finials. 5 Ridge Crests, in wood. 3 Cornices and Sections. 2 Gables. Plan and Elevation of Area Cover. 36 Drawings.

PLATE 32.—Ornamental Front Brick Work, with Terra Cotta name tablet, frieze, belts and panels; niche in brick-work for statue. One Story of House in Brick, with tile and ornamental brick and brick cornice. Cornice and Pediment for half of 25 feet front. Brick Bracket and Stone Corbel. Cornice in Terra-Cotta or Galvanized Iron. 5 Chimney Tops with plans. 22 Drawings.

PLATE 33.—Fire-Screen Frame, Dining Room Extension Table, Picture Stand, Library Table, Hall Stand, Hall Chair, 2 Dining Room Chairs, Hanging Toilet Stand, Side Table, Sideboard, Couch, Seat, Wardrobe and Bachelor's Dressing-Case, Stand and Wardrobe. 36 Drawings.

PLATE 34.—13 quarter full-size sections of Base. 7 Door and Window Finish. 6 Chair Boards. 7 Door Stops. Staircase Window, elevations, sections, etc. 9 Hall and Staircase Windows. 51 Drawings.

PLATE 35.—17 Front Outside Doors, with half full-size sections, rail, molds, etc. 63 Drawings.

PLATE 36.—4 Staircases with plans and sections of rails, newals wainscot, strings and facias. 5 Newal Posts with stair finish. 3 Newal Posts. 17 Balusters. 13 Picture Mouldings. 44 Drawings.

PLATE 37.—Octagon Conservatory, with plan and half full-size sections. Conservatory and plan. 2 Grape Arbors. Summer House. 2 Well Curbs. Balcony. Cupola. Barn Finish, showing hay loft door, stable door, and half elevation of shed. Barn Doors. Gable. Bay Window. Plant Cabinet. Truss for Church Roof. Church and Spire Frame, with plan. 41 Drawings.

PLATE 38.—2 Store Fronts, with details. Plan of Confectionary Store, showing location of Counters, Shelving, Mirrors, Dumb Waiter, Stairs to Basement. Toilet Closet, and Screen dividing Store and Ice-cream Saloon; full details given for all fittings of store and saloon. 2 Bins, with shelving around columns in Grocery Store. Broom Rack. Store Shelving and Drawers. Bar Counter. Drug Store Shelving. Grocery Store Shelving and Bins. 4 Store Counters. 40 Drawings.

PLATE 39.—8 Floor Borders. Side Wall Finish in Wood. 3 Ceilings. Hall Arch Finish. 5 Beam and Post Finish. 6 Wood Cornices, half full-size. 6 Church Pews and Seats, with half full-size detail. 2 Library Book Cases. Kitchen Dresser. 2 Book Stands. Library Mantel and Book-Case. 76 Drawings.

PLATE 40.—3 Towers. 2 Cupolas. 6 Chimneys. 4 Drive Porches, with plans. 31 Drawings.

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Surplus, January 1, 1879, $4,529,373.17.

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CASH CAPITAL, $200,000.

Total Cash Assets,	$880,074 93
Re-Insurance Reserve and all other liability,	381,131 23
Cash Surplus as regards Policy-Holders,	$498,943 70
Deduct Capital,	200,000 00
Cash Surplus as regards Stockholders,	$298,943 70
Instalment Notes on hand Jan. 1st, 1880,	$1,319,170 53
Losses paid from 1874 to 1880,	1,678,344 13

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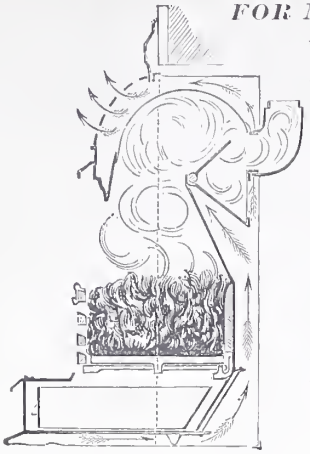

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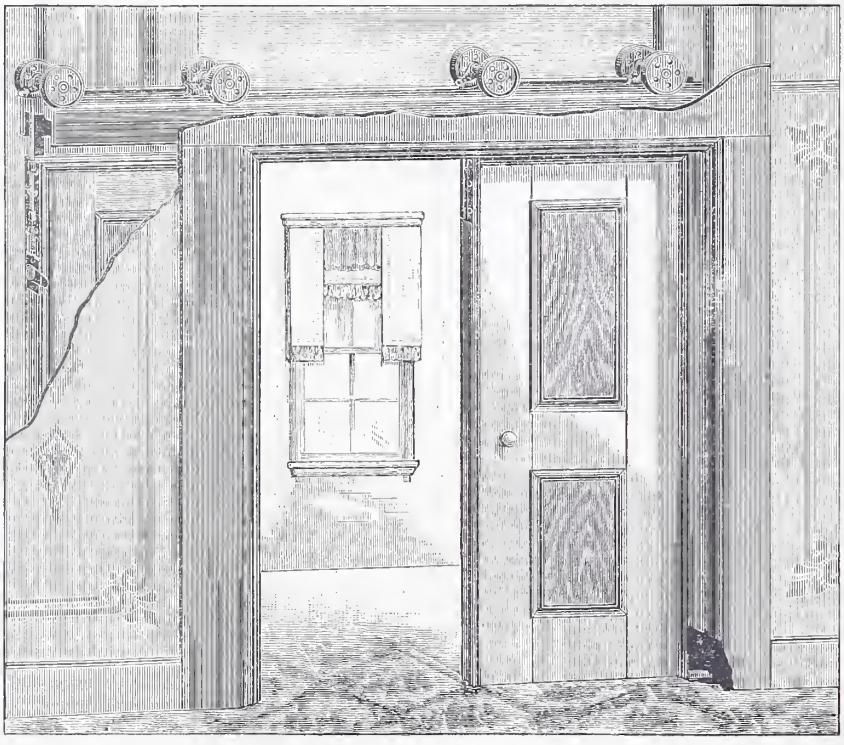

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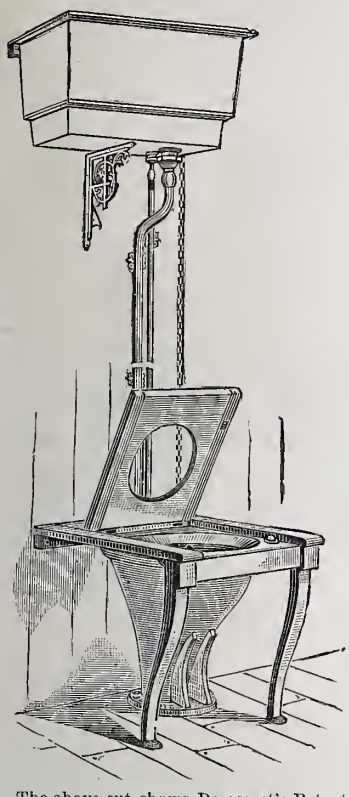

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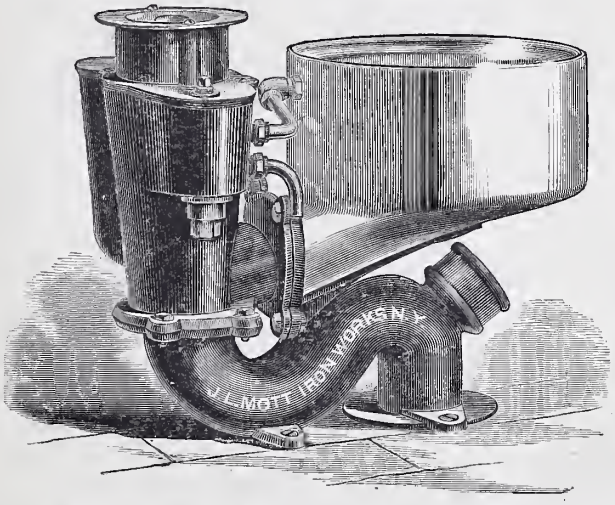

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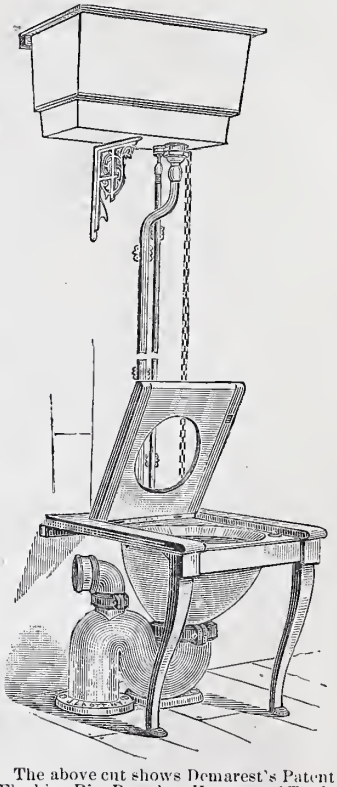

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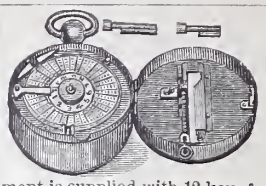

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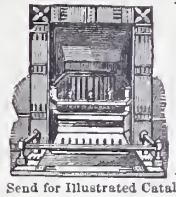

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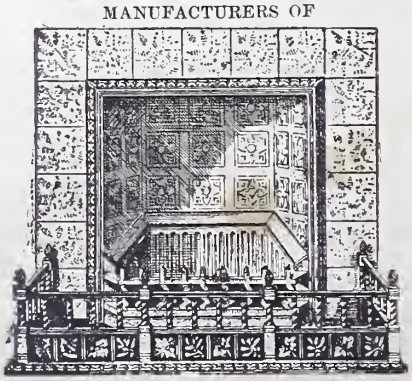

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VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } JANUARY, 1882. { WHOLE NUMBER, 172 / NEW NUMBER, 1

WITH this number we begin another year, and are introduced to many new places and faces. It is gratifying to know, that, with a few exceptions, all our old readers remain with us and that many new, and we hope, active members, have joined our ranks. There is nothing that has so good an effect on editors and publishers as an enlarged subscription list. Ours has enlarged; is enlarging daily. To realize this result, and still retain our old friends, is an accomplishment of which we have reason to feel proud, as it is an evidence of our having done our duty during the past years.

It is not necessary for us to make promises of what we intend to serve up to our readers during 1882. Suffice to say, that it is our intention to do better in the future than we have done in the past, well as we have done.

Our New Year's wish is that the season may be to our readers a precursor of all good things, and that they may grow in knowledge, wealth and happiness.

THE mechanic who reads a paper published in the interests of the trade he is engaged in, is sure, in the end, to command better wages than the workman who plods away in the same old ding-dong style of his forefathers, and takes no paper pertaining to his trade. It is easy to pick out of a shop the men who read from among the workmen. The well read man gets all the best work, greater pay, and is nearly always constantly employed, and he deserves these advantages, for his extra readiness is sure to be a source of profit to his employer.

BETWEEN eleven and twelve hundred people have been burned in a theatre at Vienna. The scenery took fire at the commencement of the performance, and the employees got so panic-strieken that the appliances for preventing the spread of fire were forgotten to be used. In a few minutes the whole building was in flames. It is easy to imagine the horrible scenes which followed. The burning of a cathedral in Santiago, South America, a number of years ago, where 2,000 persons lost their lives scarcely startled the civilized world more than did this latest horror. Is it possible that human ingenuity and foresight have reached their limits with regard to the prevention of these periodic disasters? It does seem as though these frightful reminders were absolutely necessary to keep the public mind to a point when even apparent carefulness is insisted on. The burning of the Ring Theatre should prove a terrible warning to theatre builders and managers.

INTENDING house-builders should be most careful in attending to the bed-room department. We make no objection to the house being well provided with entertaining rooms, and those of ample dimensions; but we do most strongly object to the system, too often adopted, of obtaining these at the expense of cramped passages, stairways, and confined bed-rooms. Nothing adds so much to the comfort of a man's life as good roomy bed-rooms, and nothing to the convenience of a family as plenty of them. Architects, in claiming, and unfortunately getting, ample space for reception, dining, and other rooms, and giving the least dimensions to the bed-rooms, seem to forget that in no room does a man spend so much of his time as in the latter. It should, therefore, be so large as to give plenty of room, and to have the bed so placed, that when the window or door is open it will not be in the line of direct draft. Ask a physician, and he will tell you, that in cases of severe illness, there is nothing he dreads so much as the confined room in which his patient is placed; the air in it is always foul, and can only be made fresh at a fearful risk. Looking at the question from all sides, we are strong advocates for large bed-rooms, indeed, for their comprising the best rooms in the house—for the confined closets which our architects and builders often deem it right to give us we have a profound contempt. There can be no real health enjoyed when a person lives more than half his time in a little cramped up room.

LAST month we referred to the falling of a building on the corner of Grand street and South Fifth avenue, in New York, and took occasion to find fault with the Building Department. The recent spasmodic efforts of this department in inspecting and condemning buildings, rather favors the notion that the officials have realized the fact that the tumbling down of these buildings and the killing of ten persons, were results entirely due to their remissness and—shall we say criminalty! If a little of this spasmodic energy was applied to the inspection of buildings now in course of erection, the danger of murdering tenants by the falling of buildings during the next generation would be very much lessened. There are people foolish enough to imagine that the department is at all concerned about the alterations made or required in any building in the city. Buildings may fall, buildings do fall, lives are lost, property is destroyed, inquests are held and the Department of Buildings is censured. Not the slightest attention is paid to the censure, and the inquest is soon forgotten except by the families who have suffered. About $100,000 is paid every year to the department for examining buildings which are undergoing repairs or alterations. How much is received by the citizens for this outlay is a problem which the superintendent has not yet had to solve. We in our wisdom, and with our modern notions, are apt to ridicule the builders of old who were in a state of happy ignorance respecting brown stone fronts, iron columns, zinc cornices, elevators and steam heating apparatus; but we do well to recall the fact that these men built for all time, whereas many of the buildings of the present day hardly last our time.

THERE can be no questioning the fact that America is very much ahead of Europe in the rapid conver-

sion of wood to useful purposes, but we must confess that in one branch of wood manipulation we are considerably behind. We refer to wood-turning. It is very true that we have invented several distinct machines for turning wood from given patterns, and which work almost automatically, yet we find that in beauty of design, excellence of finish and regularity of form our turners do not accomplish what they might if they had some means of comparing their work with that of their fellow-workmen or foreign brethren. Automatic turning machines have, no doubt, had a great deal to do with lowering the standard of lathe work, but the present style of cabinet work and building, which calls for a great deal of fine turning, may have a tendency to give this branch of art an impetus that will raise it out of the stagnant condition where it has lain so long. What is wanted is a society of turners, an association which would have for its object the discussion of such matters as pertain to the art of turnery, and to encourage correct taste, accuracy of workmanship and a knowledge of the adaptation of the work of the lathe to the various purposes for which it is employed.

Nearly every town in Europe of any importance has its "Turners' Club," in which quarterly, half-yearly or yearly exhibitions of lathe work are held and prizes given to those members who produce the best specimens of their work.

Such institutions established in the larger cities in this country could not fail of making their influence felt for the better in a very short time, and now where grotesque and crude forms in our turned articles reigns supreme, we should find beauty and simplicity hand in hand, yet so combined as to give an appearance of strength and durability that does not now obtain.

Is not this matter worthy of the consideration of those of our readers who are interested in lathe work?

Lithographic Illustrations.

PLATE 1 exhibits a quaint-looking house, designed for Mr. Wm. H. Cole by E. G. W. Dietrich, architect. The estimated cost of this building is $3,500. In some localities it may be built much cheaper.

Plate 2 exhibits eight designs for art woodwork. This is an exceedingly rich plate, and contains a great many hints and suggestions that joiners, cabinet-makers and designers may avail themselves of. The plate was furnished us by E. G. W. Dietrich.

Plate 3 shows designs for two sideboards, with side views showing method of making. These designs were furnished us by S. N. Small, architect, 48 Canal street, Boston, Mass.

On Plate 4 we show a design for a combined desk and cabinet. The drawing is by Howard S. Bush, architect, 52 William street, New York.

Plate 5 shows two very fine designs by an amateur. One is for a wall cabinet, and the other is for a dressing-case. Both are taken from actual examples. They were executed by the designer, L. E. Lyon, of Iowa City, Iowa. The dressing-case was designed, made and completed in about five weeks, by working at odd times. Both are fine examples of amateur work.

We have frequently been asked to publish some designs for furniture in the Anglo-Japanese style. On Plate 6 we offer thirteen designs in this style, all of which are taken from late issues of the *Cabinet Maker*, an excellent journal published in London, England. Some of the ideas are perhaps a little too eccentric to captivate at first sight (notably the bracket and upright cabinet in right hand corner), but in the mantel, cabinet above, chair and table, "Anglo-Japanese" is unquestionably "served up" in a taking form. The application of genuine Japanese frets to these articles gives to them an additional interest and value, and, moreover, these original frets cannot be produced or imitated in this country, for we have not yet acquired that complicated art. It is a pity that in a pen-and-ink sketch it is impossible to show the colorings of such productions; the real Japanese leather paper at back, and the pottery does so much to make up the general effect. The work-table, music cabinet and flower tripod are, perhaps, first in merit, and all will probably be useful to our manufacturing readers who are looking out for something original in Anglo-Japanese.

On Plate 7 we show a number of designs for inlaid work. Some of them are very pretty, and will, no doubt, interest some of the best workmen among our readers.

Plate 8 shows the manner of framing a bank barn. Explanations are given in our correspondence column.

Planing Mills.

BY J. T. L.

THE subject of side-cutters and the parts belonging to them need special attention, for, as far as my observation goes, they are the most abused parts of a matcher.

As I have said in a previous article, the pulley to a side-cutter spindle should cover the whole space between the two boxes with only just space enough left to slip the belt off, and should go on tight. This stiffens the spindle, and it will run very much better than a little narrow pulley just wide enough to take the belt. It is a mistake to make the spindles too small, which very many manufacturers do. A side-cutter spindle should not be less than 1¾ inches, and for my own use I would put on the other ¼ inch and make it an even 2 inches. This gives stability and insures you an even cut, especially for heavy work, which it is impossible to get from a small spindle.

In common with everybody else, I have always used the side-cutter head that screws directly on to the spindle. I think this is wrong, for the reason that if used in one place, as all well-regulated mills should be, I think they gradually tend to spring it, and after a while the heads will wobble, and the tongue cut small and the groove large. My idea is that the spindle should have a spline cut in it, and a nice-fitting feather in the head and the set screw go down on to the feather, instead of directly on to the spindle. The constant screwing of the set screw down acts like pening a shaft or piece of iron, and gradually tends to bend it. Although it is gradually done, it is certain. A large spindle, however, stands it better than a small one, and that is one reason, among many others, why I would recommend a large spindle. Some manufacturers make the bottom of the spindle come to a point. This is a good idea, in one sense, and a bad one in another. With this center point the bottom of the spindle is always tight, while a straight one becomes loose as it wears into the box. The disadvantage is that they wear down into the box faster and are always giving you trouble about the side-cutter dropping down. I like the straight shaft best, for the reason that you can put a piece of hardened steel under the bottom of it, which prevents it from wearing down. A piece of steel $\frac{3}{10}$th thick, hardened as hard as fire and water can harden it, will last indefinitely and always keep your side-cutter up in its place.

It is the custom of many to put in a set of bits and file them up till they are worn out, which is bad practice, for the bit on the side next to the set screw will almost invariably wear the most. Consequently this one wears the most, and in a little while the head is badly out of balance.

Bits, whether solid or otherwise, should be taken out frequently and balanced, as much as you would balance knives on the cylinders. I know a great many who are very particular about balancing cylinder knives who never think of balancing up side-cutter bits. Every part needs close attention, and not one part have special care and the rest go at loose ends

Side-cutter spindles should be made of the very best quality of *hammered* steel. It is poor policy to take the low grade roll steel to make such things of, for sooner or later they cost dear. Also they should not be annealed before turning up, for this makes them uneven in temper, and you are just as apt as any way to get a soft spot just right in the bearing, where, of all places, it ought not to be. The best thing to make them of is the best grade of square steel, fitted without annealing (unless you can get good hammered steel). They should be fitted up with the nicest care, with good long top boxes especially, and well-balanced pulleys and heads, and you are ready for anything.

There are so many different opinions about the kind of side-cutters that an opinion of mine would not amount to much. I very well remember when the solid bits first came out. I brought some home, and they laughed at me and said they were of no use. Now they are almost universally used in some shape. The Doncaster were used to some extent at that time, and within a few years the Shimer has come out, which is only a little different

PLATE No. 1

Residence for
Mr. Wm H. Cole
on the Hudson
Cost $3500.

E. G. W. Dietrich Architect
356 Henry St. Brooklyn, N.Y.

plan of the Doncaster. But I think the straight solid bit is used most of all. These are easily taken care of and do good service. One great objection is, they are often uneven in temper. The three-part bit is a standby, however, for they can be so easily changed into different things that where the solid bit is used they ought to be kept for special cases, which often come up, especially in job mills.

The Stability of Structures.

BY F. E. KIDDER, B.C.E.

II.

FOUNDATIONS (*Continued*).

CLASS II.—Foundations in situations where an artificial bearing stratum must be formed in consequence of the softness or looseness of the soil.

FOUNDATIONS IN SOFT EARTHS.

There are three materials in general use for forming an artificial bearing stratum in soft soils. Whichever material is employed the bed is first prepared by excavating a trench sufficiently deep to place the foundation courses below the action of frost and rain. Great caution should be used in cases of this kind to prevent unequal settling.

The bottom of the trench is made level, and covered with a bed of stones, sand or concrete.

STONES.—When stone is used, the bottom of the trench should be paved with rubble or cobble stones, well settled in place by ramming. On this paving a bed of concrete is then layed.

SAND.—In all situations where the ground, although soft, is of sufficient consistency to confine the sand, this material may be used with many advantages as regards both the cost and the stability of the work. The quality which sand possesses of distributing the pressure put upon it, in both a horizontal and vertical direction, makes it especially valuable for a foundation bed in this kind of soil, as the latteral pressure exerted against the sides of the foundation pit greatly relieves the bottom.

There are are two methods of using sand, viz.: in layers and as piles. In forming a *stratum* of sand, it is spread in layers of about nine inches in thickness, and each layer well rammed before the next one is spread. The total depth of sand used should be sufficient to admit of the pressure on the upper surface of the sand being distributed over the entire bottom of the trench.

Sand piling is a very economical and efficient method of forming a foundation under some circumstances. It would not, however, be effective in very loose, wet soils, as the sand would work into the surrounding ground.

Sand piling is executed by making holes in the soil, or in the bottom of the trench, about six or seven inches in diameter, and about six feet deep, and filling them with damp sand, well rammed so as to force it into every cavity.

In situations where the stability of piles arises from the pressure of the ground around them, sand piles are found of more service than timber ones, for the reason that the timber pile transmits pressure only in a vertical direction, while the sand pile transmits it over the whole surface of the hole it fills, thus acting on a large area of bearing surface. The ground above the piles should be covered with planking, concrete, or masonry, to prevent its being forced up by the lateral pressure exerted by the piles, and on the stratum thus formed the foundation walls may be built in the usual manner.

FOUNDATIONS ON PILES.—Where the soil upon which we wish to build is not firm enough to build the foundation upon, one of the most common methods of forming a solid foundation bed is by driving wooden piles into the soil and placing the foundaiton walls upon these.

The piles are generally round and have a length of about twenty times their mean diameter of cross section. The diameter of the head varies from nine to eighteen inches. The piles should be straight grained and free from knots and ring strokes. Fir, beach, oak, and Florida yellow pine are the best woods for piles, though spruce and hemlock are very commonly used.

Where piles are exposed to tide-water they are generally driven with their bark on. In other cases it would not be essential.

Piles which have to be driven through hard ground generally require to have an iron hoop fixed tightly on their heads to prevent them from splitting, and also to be *shod* with iron shoes, either of cast or wrought iron.

Long piles may be divided into two classes: those which transmit the load to a firm soil, thus acting as pillars; and those where the pile and its load are wholly supported by the friction of the earth on the sides of the pile.

In order to ascertain the safe load which it will do to put upon a pile of the first-class, it is only necessary to calculate the safe crushing strength of the wood; but for piles of the second and more common class, it is not so easy to determine the maximum load which they will safely support.

Many writers have endeavored to give rules for calculating the effect of a given blow in sinking a pile, but investigations of this kind are of little practical value, because we can never be in possession of sufficient data to enable us to obtain even an approximate result. The effect of each blow on the pile will depend on the momentum of the blow, the velocity of the ram, the relative weights of the ram and the pile, the elasticity of the pile head, and the resistance offered by the ground through which the pile is passing; and, as the last named conditions cannot well be ascertained, any calculations in which they are only assumed must of necessity be mere gusses.

LOAD ON PILES.—Prof. Rankine gives the limits of the safe load on piles, based upon practical examples, as follows:

For piles driven till they reach the firm ground, 1,000 lbs. per square inch of area of head.

For piles standing in soft ground by friction, 200 lbs. per square inch of area of head.

But, as in the latter case, so much depends upon the character of the soil in which the piles are driven, such a general rule as the above is hardly to be recommended.

Several rules for the bearing load on piles have been given, founded upon practical experience, and they are probably the best that we can rely upon with our present knowledge of the subject.

Perhaps the rule most commonly given is that of Maj. Sanders, U. S. Engineer. He experimented largely at Fort Delaware; and in 1851 gave the following rule as reliable for ordinary pile driving.

SAUNDERS' RULE for determining the load for a common wooden pile, driven until it sinks through only small and nearly equal distances under successive blows:

$$\text{Safe load in lbs.} = \frac{\text{weight of hammer in lbs.} \times \text{fall in inches.}}{8 \times \text{sinking at last blow.}}$$

Mr. John C. Trautwine, C. E., in his pocket book for engineers, gives a rule which appears to agree very well with actual results:

His rule is expressed as follows:

$$\text{Extreme load in tons of 2,240 lbs.} = \frac{\text{cube root of fall in feet} \times \text{weight of hammer in lbs.} \times .023.}{\text{Last sinking in inches} \times 1.}$$

For the safe load he recommends that one-half the extreme load should be taken for piles thoroughly driven in firm soils; and one fourth when driven in river mud or marsh.

According to Mr. Trautwine, the French engineers consider a pile safe for a load of 25 tons when it refuses to sink under a hammer of 1,344 lbs. falling 4 feet.

The test of a pile having been sufficiently driven, according to the best authorities, is that it shall not sink more than one-fifth of an inch under thirty blows of a ram weighing 800 pounds, falling five feet at each blow.

A more common rule is to consider the pile fully driven when it does not sink more than one-fourth of an inch at the last blow of a ram weighing 2,500 pounds, falling 30 feet.

In ordinary pile driving for buildings however, the piles often sink more than this at the last blow, but as the piles are seldom loaded to their full capacity it is not necessary to be so particular, as in the foundations of engineering structures. The common practice of architects is to specify the length of the piles to be used, and the piles are driven until their heads are just above ground and then left to be levelled off afterwards.

CONCRETE.—Concrete is largely used for foundation beds in soft soil, aud is a very valuable article for this purpose. as it affords a firm solid bed, and it can be spread out so as to distribute the pressure over a large area.

Concrete is an artificial compound, generally made by mixing lime or cement with sand, water and some hard material, as broken stone, slag, bits of brick, earthenware, burnt clay, shingle, etc. If there is any choice of the materials forming the base of the concrete, the preference should be given to fragments of a somewhat porous nature, such as pieces of brick or limestone, rather than to those with smooth surfaces.

The broken material used in the concrete is sometimes for convenience called the *aggregate*, and the mortar in which it is incased the matrix. The aggregate is generally broken so as to pass through a $1\frac{1}{2}$ or 2 inch mesh.

In damp ground or under water, hydraulic lime should of course be used in mixing the concrete.

LAYING CONCRETE.—A very common practice in laying concrete is to tip the concrete, after mixing, from a height of 6 or 8 feet into the trench where it is to be deposited. This process is objected to by the best authorities on the ground that the heavy and light portions separate while falling, and that the concrete is therefore not uniform throughout its mass.

The best method is to wheel the concrete in barrows, immediately after mixing, to the place where it is to be laid, and gently

tipping it into position, carefully ramming into layers about 12 inches thick. After each layer has been allowed to set, it should be swept clean, wetted, and made rough by means of a pick for the next layer.

It is the custom of some contractors to make the concrete courses of the exact width specified, keeping up the sides with boards if the trench is too wide. This is a bad practice; for when the sides of the foundation-pits are carfully trimmed, and the concrete rammed up solidly against them, the concrete is less liable to be crushed and broken before it has entirely consolidated. It is, therefore, desirable that the specifications for concrete work should require that the whole extent of the excavation be filled, and if the trenches are excavated too wide, the extra amount of concrete to be furnished at the contractor's expense.

Concrete made with hydraulic lime is sometimes designated as *Béton*.

The pressure allowed on a concrete bed should not exceed one-tenth part of its resistance to crushing. Trantwine gives as the average crushing strength of concrete 40 tons per square foot.

Foundations in Compressible Soil.—The great difficulty met with in forming a firm bed in compressible soils arises from the nature of the soil and its yielding in all directions under pressure.

There are several methods which have been successfully employed in soils of this kind.

I. When the compressible material is of a moderate depth, the excavation is made to extend to the firm soil beneath, and the foundation put in as in firm soils.

The principal objection to this method is the expense which would often be very great.

II. A second method is to drive piles through the soft soil into the firm soil beneath. The piles are then cut off at a given level and a timber platform laid upon the top of the piles, which serves as a support for the foundation, and also ties the tops of the piles together.

III. A modification of the latter method is to use shorter piles which are only driven in the compressible soil. The platform is made to extend over so large an area that the intensity of the pressure per square foot is within the safe limits for this particular soil.

IV. Another modification of the second method consists in using piles of only 5 or 6 inches in diameter and only 5 or 6 feet long, and placing them as near together as they can be driven. A platform of timber is then placed on the piles as in the second method.

The object of the short piles is to compress the soil and make it firmer. * "This practice is one not to be recommended; its effect being usually to pound up the soil, and to bring it into a state which can best be described by comparing it to batter-pudding."

V. Still another method is to surround the site of the work with sheet piling (flat piles driven close together so as to form a sheet), to prevent the escape of the soil, which is then consolidated by driving piles into it at short distances from each other. The piles are then sawn off level, and the ground excavated between them for two or three feet and filled up with concrete; the whole is then planked over to receive the superstructure.

The great point to be attended to in building foundations in soils of this kind is to distribute the weight of the structure equally over the foundation, which will then settle in a vertical direction, and cause little injury, whereas any irregular settlement would rend the work from top to bottom.

* Dobson on Foundations.

Chimney Stack Cornices.

BY ONE OF THE UNROOFED.

THE recent gale opened a good many of the sore places of our modern buildings, and among them the cornices of brick chimney stacks were finely displayed. With all proper apologies to my friends the slaters, who are doubtless special admirers of this style of ornamentation, I venture to question the desirability of expending brieks and labor—consequently money—upon any such friable excrescences.

The function of a chimney stack is to raise the outlet of the flue above the little whirling eddies of air that are produced by the interruptions of which roofs, gables, parapets, etc., present to the regular atmospheric flow. Just as the piers of a bridge make eddies in the river-stream, so do all these obstacles make eddies in the stream of air which we call the wind; and these eddies are downflows that produce smoky chimneys.

A little reflection will show to the reflector that in order to gain the object of thus raising the flue outlet, there should be the least possible impediment to free airway presented by the elevating device, whatever that may be. It should be as slender as possible, consistent with stability. The best theoretical form would be an acute cone, as narrow as possible in proportion to its height.

But how does the modern builder carry out this desideratum? Simply by raising his stack high enough to escape the surrounding ridges, projections, etc., and then carefully superadding to the stack itself, a top-heavy, ugly, useless series of courses of overhanging bricks, to give it what he calls "a finish," which finish supplies the wind with a new deflecting obstacle to overcome, thus compelling the builder to superadd another erection in the shape of a zinc tube, or cowl, or patent something. Even the æsthetic bricklayer himself, however devoted to his overhanging "finish," must admit that the first and fundamental requirement in architecture is stability, and next to practical stability, that the sentiment or feeling of stability shall be satisfied when contemplating any structure. Imagine a graceful Egyptian obelisk inverted and standing point downwards. However perfect its proportions it would thus become intolerably offensive to the eye, simply on account of the suggested instability.

This chimney stack cornice, this æsthetic "finish" is evidently a very mild imitation of a Grecian capital, but the modern followers of Ictinus and Callicrates, in brick, seem to forget that the outspreading of the capital and abacus of a column was always designed for the purpose of giving a more stable bearing to the entablature resting upon it, and that a mere column with a top-heavy capital standing alone, as we see them nowadays, as Masonic candlestieks, etc., was an abomination unknown to the ancient Greek.

Every such isolated steeple-like erection should, if possible, taper upwards. The leaning tower of Pisa, in spite of its exquisite beauty of form, and the purity of its marble, is a painful object to contemplate on account of its apparent instability.

But the bricklayers' imitations of Corinthian capitals on our chimney stacks are not only apparently unstable, they are atrociously actually so. Exposed to rain and frost and wind they are continually dropping one or another of their half-supported overhanging bricks. This brick breaks a slate or two, and then slides down the roof to the gutter, and usually bends, or breaks, or separates it from the eaves, and thus secures a nuisance. As I said at the outset this is very agreeable to the slater, but, like the frogs in the fable, we poor dwellers in houses must tell the slater that what is sport to him is death to us.

Now for a practical illustration of the above. I live in a genteel villa residence in a very genteel neighborhood, as may be certified by the fact that it is called a "Park." From the time of my first occupation of the genteel villa up to the 18th of January last, the dining room chimney was villainously addicted to smoking at capricious intervals. On that day ("hurricane Tuesday") the tall zinc tube with patent something on the top was blown over, and with it came much of the cornice of the stack. Since that time the chimney has smoked no more. On Friday last, two other tall tubes of another stack came down, bringing with them nearly all the cornice. This time it was blown inwards, and the roof is crushed accordingly. Up to last Friday the kitchen fire was an habitual smoker. Since Friday, when its stack cornice came down, it has renounced the pernicious habit, but whether the renunciation is permanent remains to be proved. At any rate I shall request the bricklayer to remove all cornices from the stacks, make them taper like an obelisk, as thin as possible to the smoke oulet, and then I believe that chimney pots will be perfectly superfluous, or if any pots must be added, they shall have no imitation of either Doric, Ionic, or Corinthian wind-whirling capitals excrescing around their throats.—*The Building Times.*

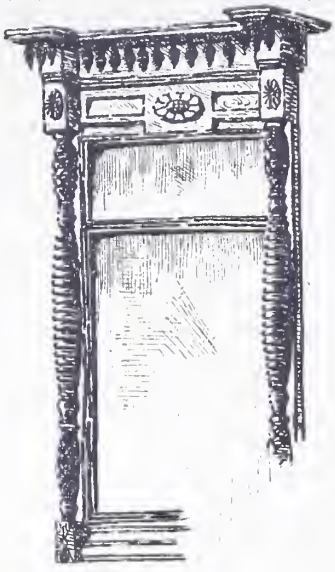
Grindstones.

THERE are many simple but highly useful articles met with in our every-day pursuits, which, from our very familiarity with them, are held in less regard than their indispensable character clearly warrants. Chief among these, at least to the mechanic, is the grindstoue, which is the foundation stone to most of our mechanical trades, and this place it holds in every country. In the whole range of mechanics, with all modern improvements, there has been applied no mechanism or process yet able to supersede it in its peculiar office, and it is the one tool in the mechanical arts that improvement has not added to nor inveution displaced. It has been said that the plow and the sickle are of equal antiquity. The spirit of improvement has touched both, but left the grindstone unchanged. Its usefulness in the early ages was great, and scieuce has not lessened its value by its perfection of other means for like results.

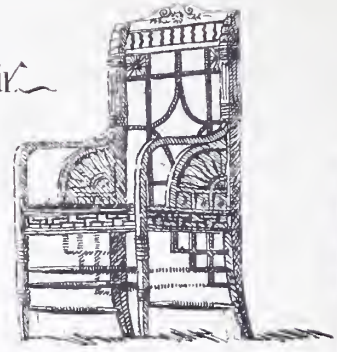
The utility and importance of the grindstone could not be guessed by those unacquainted with its capabilities. With its even surface running as truly as any turned wheel, it will perform work with a rapidity and precision attainable by no other means, and in the hands of those who understand how to keep and use it, it is capable of adaptation to intricate and fine work; but with those who do not understand it, it is rude, and the very opposite of what the educated craftsman would select for any purpose of fine work. In Lewis's pamphlet No. 9, he says: "It is an heirloom of antiquity used among us as we received it, and without any attachment or improvemeut. It alone can cut and shape expeditiously that which is prepared to cut and shape all other hard materials, viz., east-steel hardened. It is still employed to give the finest edge, the most even surface, and the brightest polish, and is quickest to accomplish it. The emery wheel answers but few of its purposes,

PLATE No 2

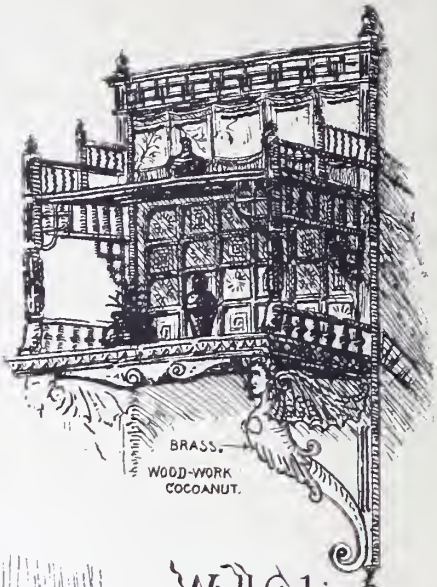
Sketch of an Old Looking Glass Frame in a House at Newburgh, N.Y.



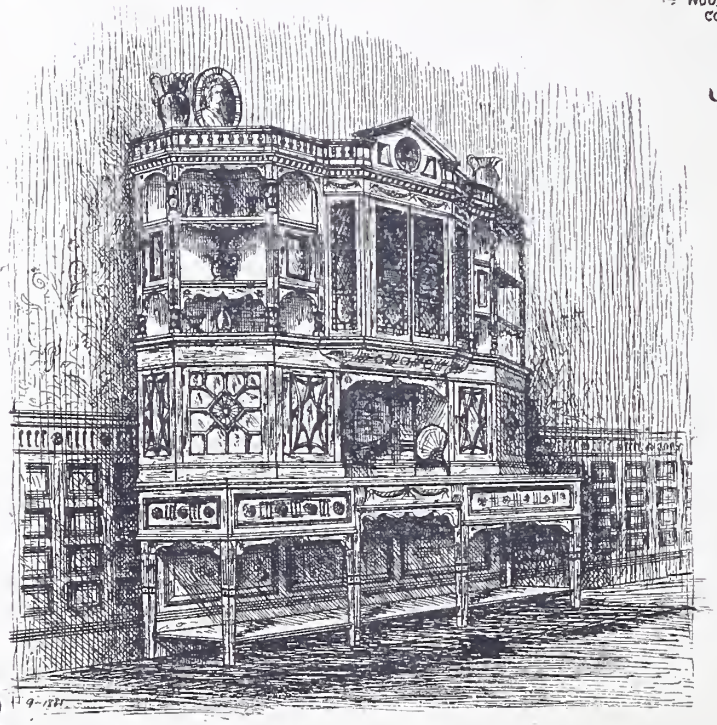
Chair.

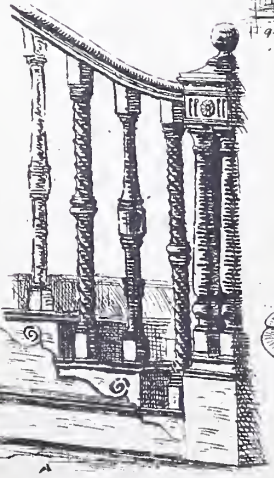


Ernst G.W. Dietrich, Des & Del.
356 Henry St. Brooklyn, N.Y.



Wall Cabinet

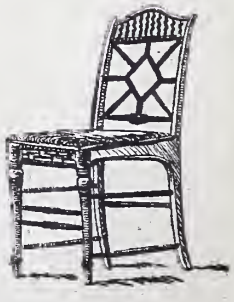




Colonial Newel, ect.

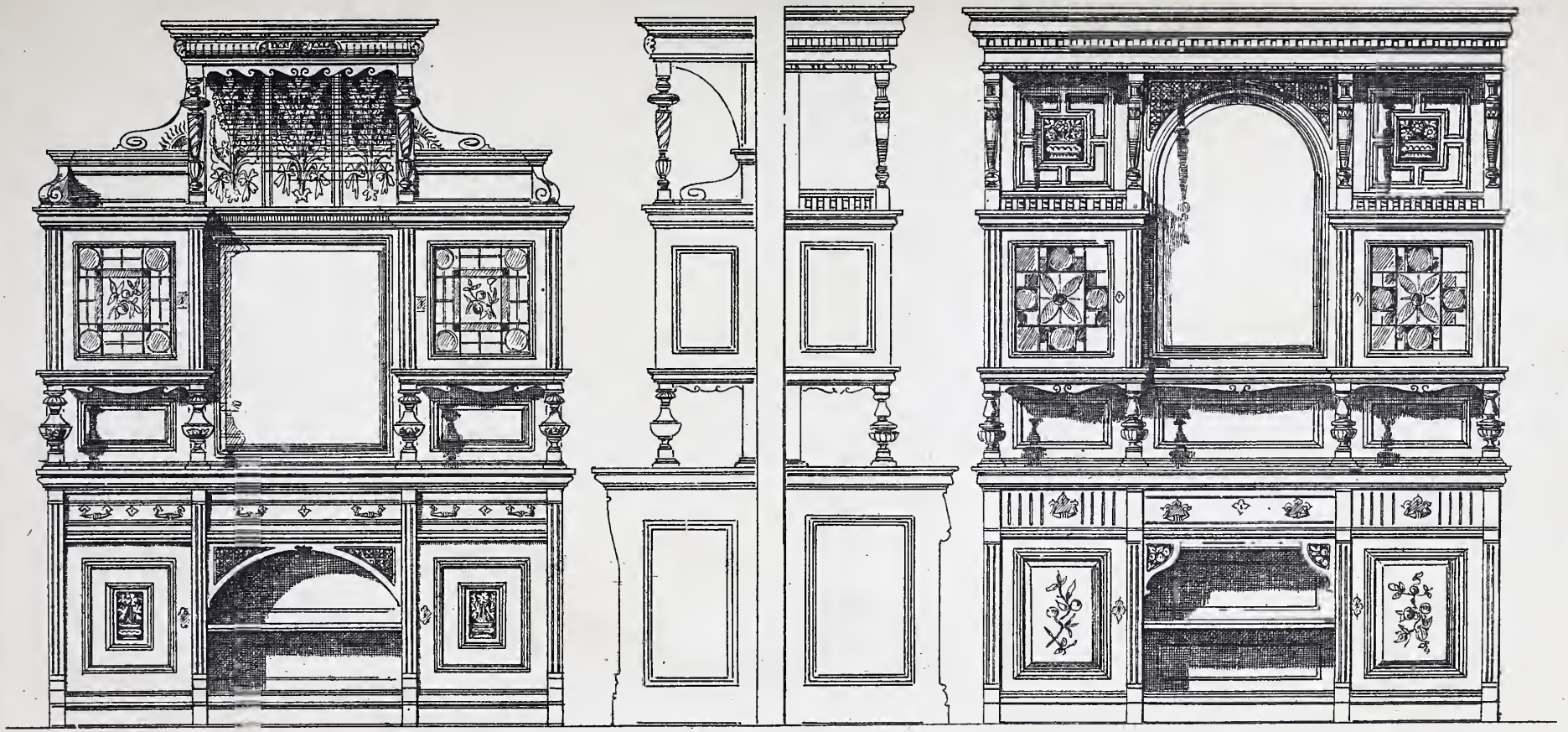
Buffet.

In Pediment of Buffet.



Chair.

PLATE No. 3



S.N. Small. Designer

and nothing we have could supply its place. The file has its own peculiar uses, but in contact with the grindstone its thousand small cutting edges would be reduced to polished plainess. It is useful everywhere it is found, and is still required where the finest instruments are made or the hardest metals worked. It has come to us as we have it, and in all likelihood will pass down to other ages the same—a simple circular stone revolving on an axle.

The iron-worker in the work-shop is particularly interested, or should be, in this tool; and as it is generally one of the shop fixtures, it receives less attention as to keeping in order than if under some one individual charge. As the shape of the cutting edges of tools is of as much importance as their keenness, the grindstone should not be neglected. We are indebted to Mr. J. E. Mitchell, the well-known dealer in grindstones, located at the corner of York Avenue and Vine Street, Philadelphia, for some interesting facts in this connection, and we give below the rules which his long experience has proved useful in keeping this indispensable tool in good condition. They read as follows, and deserve to be posted up wherever a grindstone is used :—

RULES FOR THE CARE OF GRINDSTONES.

1. Don't waste the stone running it in water, nor allow it to stand in water when not in use, as this will cause a soft place, and consequent uneven wear.

2. Wet the stone by dropping water on it from a pot suspended above the stone, and stop off the water when not in use.

3. Do not allow the stone to get out of round, but true up with piece of gas pipe or a "hacker."

4. Do not leave the stone out of doors in the wind and weather, as this hardens it, and makes it less effective.

5. Clean off all greasy tools before grinding, as grease or oil destroys the grit.

6. When you get a stone that suits your purpose, keep a sample of the grit to send to the dealer to select by, as in this way you can always secure one that suits.

In closing this article, we would say that not the least interesting fact is the manner of procuring some of these stones, notably those from Nova Scotia, where the phenomenon of the immense rise and fall of the tides in the Bay of Fundy (between 60 and 70 feet) is utilized for this purpose. At low tide a large stone is quarried from the lower cliff side and chains fastened to it, passing over scows floating alongside; as the tide rises the scows lift the stone, and it is floated to a cove where it is stranded. When the water recedes it is worked round, with mallet and chisel, and removed before the next rise, which brings in another rough stone. The operatives engaged in this business are the Acadians, direct descendants of the old Huguenots, who, like the product of their toil, have made little change from their ancient primitiveness; their quaint dress and simplicity forming a pleasant link with the past.—*The Hub.*

Ornamenting Punches.

BY REV. J. L. ZABRISKIE.

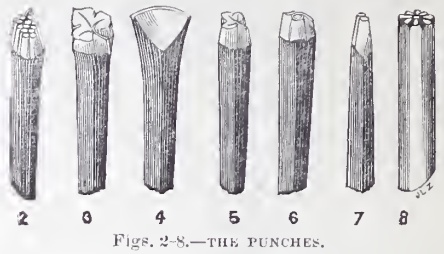
IT may be interesting to young amateur turners of wood, to have a hint on ornamenting their work by means of home-made punches.

One simple example is here given which may suggest an unlimited field for invention. Figure 1, is the top view of a box lid of wood, cut across the axis of the cylinder from which the box is made, and thus causing the ornamental pattern to be impressed on the end of the grain of the wood. This surface so shown is not one continuous plane, but is formed of three planes, slightly rising

Fig. 1.—A BOX LID ORNAMENTED WITH PUNCHES.

one above the other. The narrow outer ring is the top view of a beading, which has been turned around the lid. The second broader ring, ornamented with the grape-vine pattern, is elevated by a small step above the first, and also gradually rises towards the centre. And in the inner circle, ornamented with a double row of minute rings and a rosette, is again elevated by a little step above the others.

Seven punches, which are shown in Figures 2—8, are used in making this pattern. For convenience only about one-half of the length of the punches is here shown. These are made from ordinary eight-penny cut nails, with the exception of Figure 8, which is made from a piece of stout wire. Either the head or the point



FIGS. 2-8.—THE PUNCHES.

of the nail is used, according to the extent of punching surface required. Steel would be a better material for such tools. But common iron is much easier to work, and, even when used on hard wood, will stand a great deal of wear before being dulled or defaced.

Figure 2, is a perspective view of the working end of the punch for making the bunch of grapes. It may be made in this manner : File off the top surface of the nail head smooth and true. With a small drill bore a number of shallow holes, close together, and arrange according to fancy, to form the grapes. Then, with a graver, or diamond-point tool, shown at Figure 10, cut a moderately deep groove for the stem. And finally file away the iron, quite close up to the holes and groove, almost to a cutting edge. All the filing of this set of punches can be done with a three-cor-

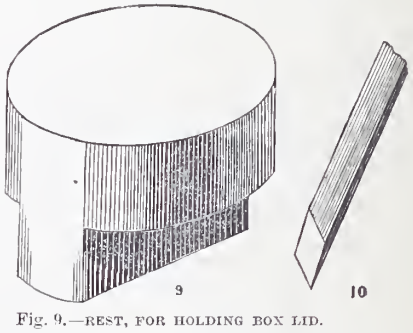


Fig. 9.—REST, FOR HOLDING BOX LID.
Fig. 10.—A GRAVER, OR DIAMOND POINT TOOL.

nered and a half-round file. The graver, of which the cutting end is shown at Figure 10, is merely a small bar of square steel, hardened and ground with one face sloping towards one of the angles of the bar, so as to leave a lozenge or diamond-shaped surface, with a sharp cutting point and two cutting edges ; and fitted with a suitable handle. On holding the punch to be cut in a vise, face up, and pushing the point of the graver, steadied by holding the tool with both hands, one will find that a little practice will enable him to engrave any ordinary lines desired on iron.

Figures 3 and 5, are the punches for the two sizes of leaves of the grape-vine. In making them, get a smooth surface on the top of the nail head ; cut the veins and stem with the graver, and file away the outer portions of the iron to the desired shape.

Figure 4 is the punch for making the vine. Engrave a semi-circular groove rather deeply on the smooth surface of the iron, and with a half-round or rat-tail file for the inside, and a flat file for the outside curve ; file away the punch nearly to a cutting edge on either side of the groove. Such a groove in the punch will leave a projecting ridge on the wood, which looks much better than a mere indentation, which would be made if the surface of the punch were a solid segment of a ring.

Figure 6 is the punch for the tendril. Cut the two curves deeply with the graver, and then file away the outside metal to correspond with the curves.

Figure 7 is the punch for the double row of little circles. It is made on the point of the nail. Drill two shallow holes close together, and then file away the surrounding iron. And lastly, Figure 8, for punching the central rosette, is made by drilling a shallow hole in the centre of the round iron, and then filling the gashes, and rounding the corners of the projections, to secure the desired shape.

In laying off the pattern, the main things to be attended to are to avoid breaking the box lid ; to space off evenly the different parts of the design ; and to secure an even depth of impression. Make a rest for holding the box lid, as shown at Figure 9. It is a short cylinder of hard wood with a smooth upper working surface, which must be a little less in diameter than the inner cavity of the box lid, and having two pieces cut from the opposite sides of the

lower end, leaving a tenon, which can be held in the vise. Place the box lid on this rest, in such manner that there shall always be a level and firm support directly under the punch.

Begin with punch, Figure 2. Place it perpendicularly on the surface of the lid, so that the small end of the bunch of grapes shall be near the point of the large circle, which is farthest from you, and strike the upper end of the punch with a hammer. If you are working on hard wood it may be uecessary to strike two or three blows.

A little experience will show what depth of impression will give the best appearance. Now turn the lid half around on the rest, and punch another grape bunch at the opposite end of the diameter of the circle. Follow the same plan for dividing the circle into quarters. Then it will be an easy matter to divide it into eighths. Next punch the larger grape leaf, Figure 3, allowing the leaf stem to slightly overlap the stem of the grape bunch. Then make the vine with punch, Figure 4. It will be noticed that this part of the pattern is a reversed curve between each pair of bunches, which is made with two impressions from the same punch, by simply turing the latter half around, to get the desired direction of the curve. If the punch will not reach half way across the space betwecn the bunches, the curve of the vine may be made longer by sliding the punch along carefully in the track of the impression just made, and then striking another light blow. Now make the impressions of the smaller leaf, and finally of the little tendril.

If all the impressions are made to slightly overlap each other, the final appearance will be better than it would be if small gaps were left in the design. The punching of the double border of little circles, and the central rosette, will be an easy matter after the vine patiern has been mastered.

This description may suggest a great variety of designs, as combinations of leaves, flower tendrlls, and other objects. And when the surrounding surface is finished with shellac and polished, such sunken designs give a very pleasing effect,—*Young Scientist.*

Intercommunication.

This department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Queries.

1. PLACING OF BRACKETS.—I would like to know the proper way to place brackets in pairs on verandas or other work. When there are double posts on a veranda ought the brackets on the corner, when there will only be three posts, show two on each face? It seems to me that this is not right, as the two heels of the brackets would nearly come together. Will some one who has noticed this matter give me their opinion on the subject.—R. E. E.

2. COST OF BUILDINGS.—There is a "jump rule" for estimating the cost of buildings by the cubic foot of the building content. Will some reader who knows, kindly advise me as to what figures are used when making such estimates.—BUILDER.

3. STAIN.—Please inform me how the yellowish stain for the inside of drawers is made and applied?—ENGINEER.

4. STEEL SQUARE.—Can any oue inform me where I can purchase "steel squares" like that one shown in "Steel square and its uses." I am anxious to get one like it, if I could find out where they are sold, and at what price.—COUNTRYMAN.

5. SAW TABLE.—Will some reader be kind enough to send for publication, a design and plan of a circular saw table, suitable for a small shop in the country. I would like the saw to raise and lower so that it ean be used for ploughing anything.—COUNTRYMAN.

6. FILLING.—I should be pleased if you would publish a receipt for wood-filling; one that is not expensive.—Z.

7. INFORMATION.—I should be pleased to get the following questions answered in the next issue of the BUILDER AND WOOD-WORKER:

1st. Which is the better paid, a good book-keeper or a good architectural draughtsman? 2d. How much per day does a good draughtsman get? 3d. I wish to be a draughtsman; how should I go about learning it? 4th. Would you advise me to learn it providing I have a talent for it? 5th. Can a good, industrious draughtsman get employment? My age is twenty; I have an ordinary education, I understand algebra, plane and solid geometry, plane trigonometry and conic sections.—H. F. POWELL.

8. BUILDING CONSTRUCTION.—Any one having a copy of "*Notes on Building Construction.*" will confer a favor on several readers besides myself by giving a brief description in the BUILDER AND WOOD-WORKER of what the work contains. I am informed from several points that the work is the best and most thorough of the kind. I want to know if this is the case, as I do not care to spend $13.50 without getting something in return.—PRACTICAL BUILDER.

9. SAWS.—What number of teeth to the inch is the best for "cut off" hand-saws, designed for general purposes? Also, please inform of the best work on saw filing, and the price?—YOUTHFUL.

10. BACK NUMBERS.—Can anyone furnish S. S. Yohe, Easton, Pa., with January, 1879, number of ILLUSTRATED WOOD-WORKER, and January number, 1880, of BUILDER AND WOOD-WORKER? Address, stating price asked for them.—S. S. Y.

11. HAND-RAILING.—I should be glad to know from anyone if black birch makes a good handrail and balusters.—K.

12. WEATHER BOARDING.—Will some member of "our family" give me the proper name for the tool used in marking off the ends of weather boarding.—CRIPPLE.

Answers.

We wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

118. BUILDING AND ARCHITECTURE.—"Querist" should, after obtaining a knowledge of algebra, geometry, etc., obtain the following books:

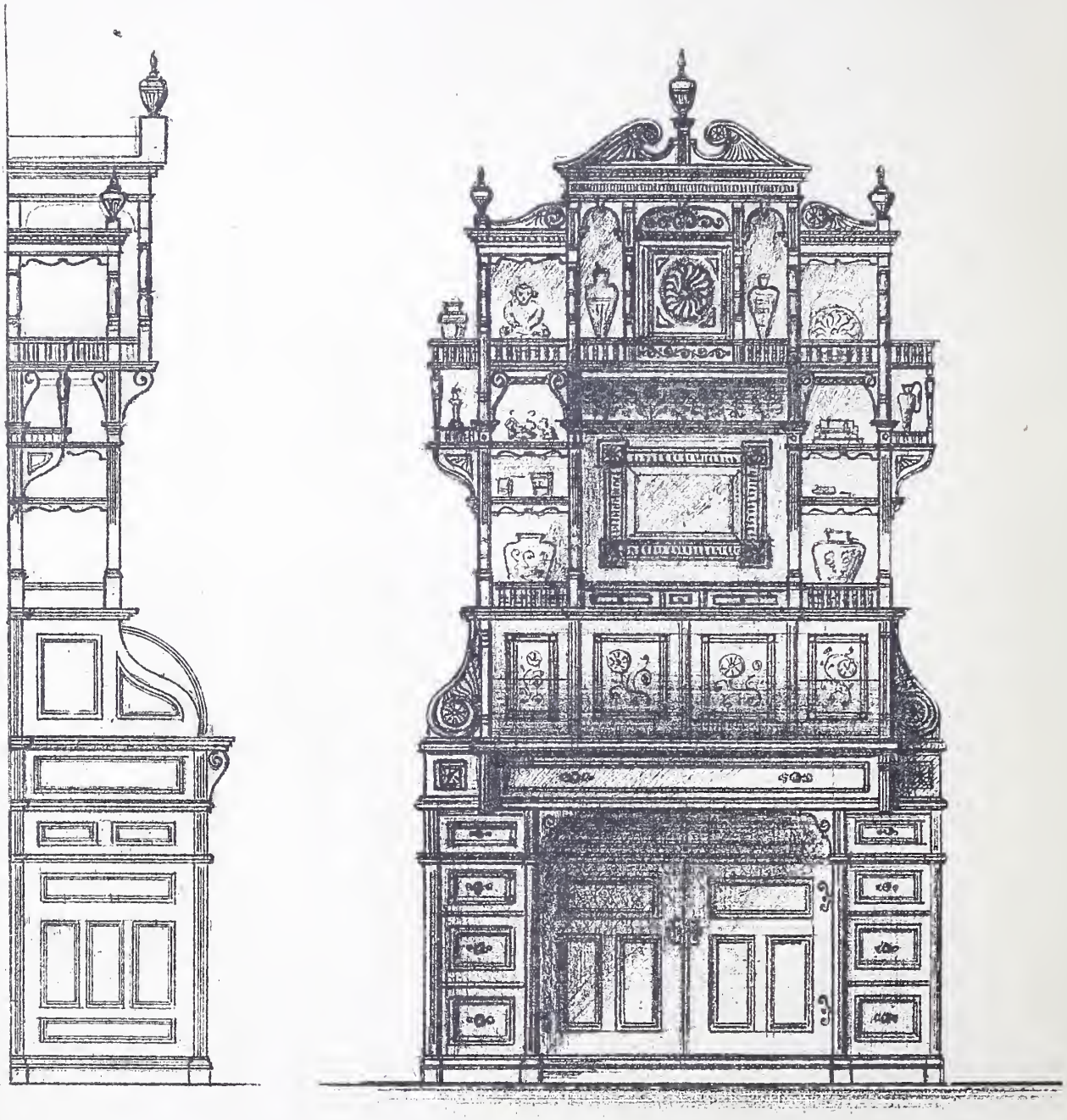
Notes in Building Construction	price $13 50
Gwilt's Encyclopedia	20 00
Practical Lessons in Architectural Drawing. By Wm. Tuthill, A. M.	2 50
Warren's Series (3 vols.)	3 75
Vogde's Prize Book	1 50
Foundation and Foundation Walls	1 50

By a close study of these works a fair theoretical knowledge of architecture may be obtained.—IBID.

98. "MITRE BOX."—I frequently set spring bed mould so that a square mitre will fit, it looks as well as the crown mould, when the ends of rafters are cut square off. CRIPPLE.

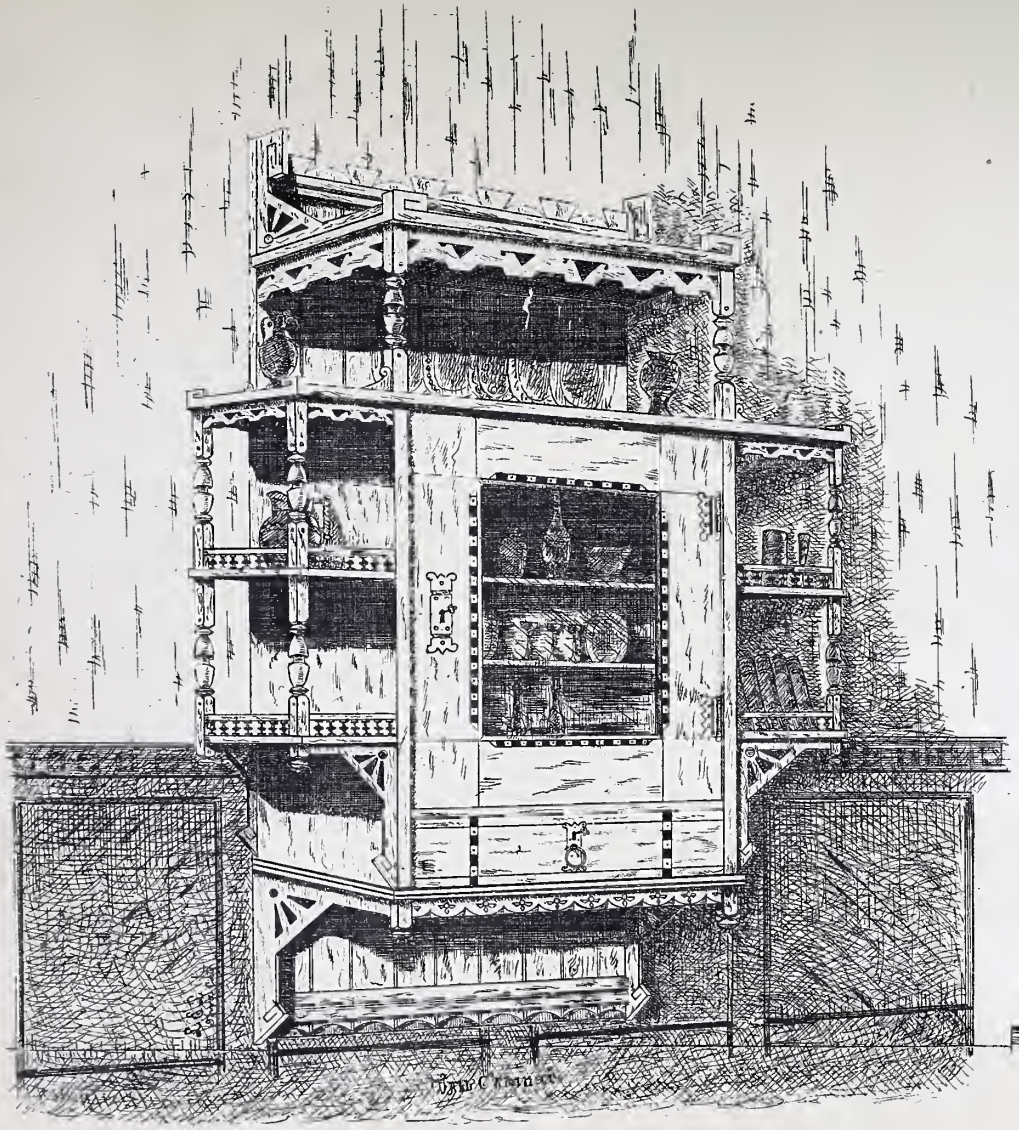
123. GLUCOSE.—Glucose may be briefly described as sugar or syrup made of corn. The product is variously known as glucose, grape, starch or corn sugar, but its chemical name is "dextrose." It was discovered by Kirchoff, a Russian chemist, in 1809. In general terms its manufacture consists in treating starch with sulphuric acid, boiling the mixture, and when the composition is complete eliminating the acid by the addition of chalk or marble dust. The solution is then drawn off and boiled down to the consistency required for either syrup or sugar. Before its manufacture in this country the product had for many years been made in Europe from potatoes, and we had imported it at prices ranging from eight to twelve cents per pound. Since the successful issue of experiments to produce the article from corn we have built up a vast industry, and now are able to export glucose at about three cents a pound. It is but natural that the industry should seek the West for a location, where corn is cheap, and where coal and water and the other requisities can be procured at as low, if not lower, figure than at the East. Hence it happens that there is no glucose factory east of New York State, but establishments have sprung up numerously throughout the West. In fact, the prejudice which some entertain regarding glucose does not exist in the West. Glucose syrup is there sold for what it really is, and it is stated that in the Western States nine-tenths of the syrups in the market contain but from five to fifteen per cent. of cane sugar. The only chemical which enters into glucose manufacture is sulphuric acid, and this is neutralized by the action of lime. A quantitive analysis conducted by an expert chemist might result in the discovery of a trace of sulphate of lime or gypsum, but this would be of such infinitesimal amount as to be perfectly harmless. The strongest argument for glucose is that its use is steadily increasing. It is estimated that the present year over 300,000,000 pounds of glucose will be placed on the markct, consuming 11,000,000 bushels of corn. This enormous product is used as a substitute for malt in brewing beer, as food for bees, and for the manufacture of various candies, but by far the larger portion goes into table syrups.—MANUFACTURER.

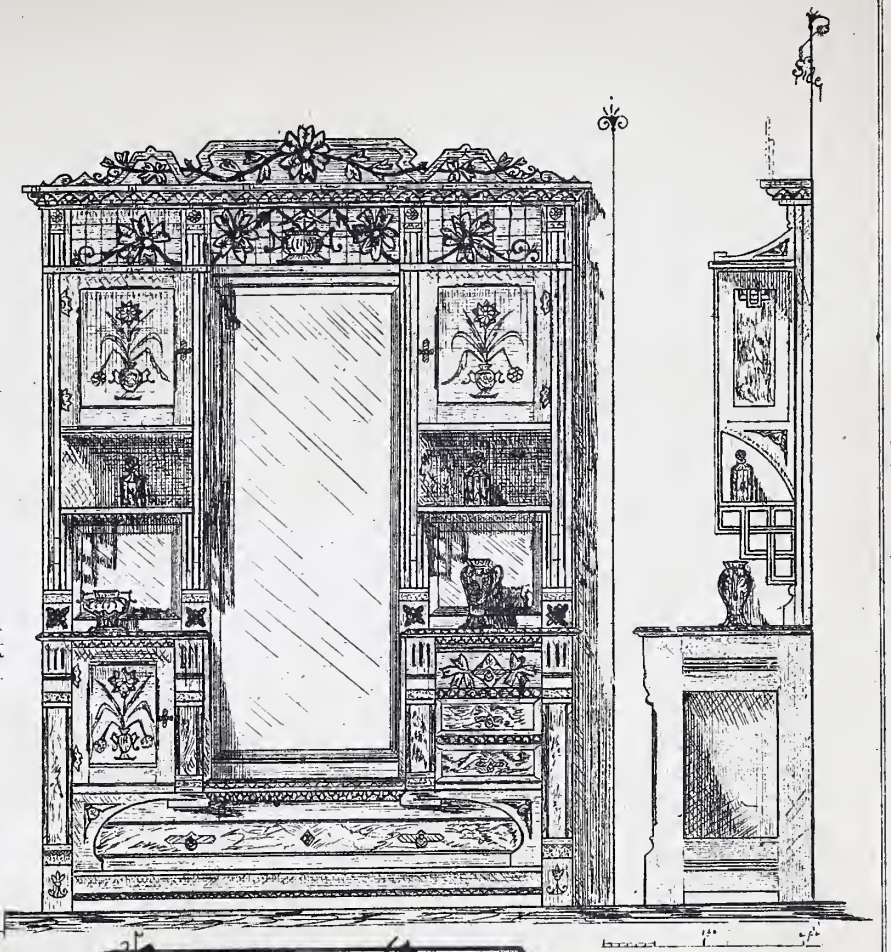
PLATE No. 4



Desk and Cabinet
for William Breese, Esq

Howard S. Bush.
Invt et del.





Dressing Case.

123. GLUCOSE.—If "Jack of All Trades," Querie 123, will consult December No. of Boston *Journal of Chemistry*, he will get the information he wants in a simple form. The article in question will enable him to form a very intelligent opinion on the subject.

The astonishing statement is there made that twelve millions of bushels of corn last year were used for that purpose, yielding almost pound for pound of syrup and sugar. As a matter of fact, some years ago I made an analysis of all the samples of sugar and molasses I could obtain at the groceries in a small inland town, and found every one, with the exception of some maple sugar and white loaf, to contain large quantities of sulph. acid.

O. H. GLOFELTY.

121.—RISERS AND TREADS.—I herewith enclose a table for determining the relation of risers to treads, or treads to risers, in stairs. I have used it in an extensive practice for many years, and I can recommend it to "Radius," as I am sure it will give him entire satisfaction :

Risers. No.	6″	6¼″	6½″	6¾″	7″	7¼″	7½″	7¾″	8″	8¼″	8½″	8¾″	9″	9¼″	9½″	9¾″	10″	10¼″	10½″	10¾″	11″	11¼″	11½″	11¾″	12″	12¼″	12½″	12¾″	13″	13¼″	13½″	13¾″	14″	Treads. No.
1	1.0	0.6″	0.6¼″	0.6½″	0.6¾″	0.7″	0.7¼″	0.7½″	0.7¾″	0.8″	0.8¼″	0.8½″	0.8¾″	0.9″	0.9¼″	0.9½″	0.9¾″	0.10″	0.10¼″	0.10½″	0.10¾″	0.11″	0.11¼″	0.11½″	0.11¾″	0.12″	0.12¼″	0.12½″	0.12¾″	0.13″	0.13¼″	0.13½″	0.13¾″	0.14″	1
2	2.0	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	2
3	3.0	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	3
4	4.0	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	4
5	5.0	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	5
6	6.0	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6
7	7.0	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7
8	8.0	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8
9	9.0	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	9
10	10.0	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	10
11	11.0	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	11
12	12.0	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	12
13	13.0	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	13
14	14.0	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	14
15	15.0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	15
16	16.0	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	16
17	17.0	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	17
18	18.0	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	18
19	19.0	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	19
20	20.0	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	20
21	21.0	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	21
22	22.0	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	22
23	23.0	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	23
24	24.0	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	24
25	25.0	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	25
26	26.0	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	26
27	27.0	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	27
28	28.0	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	28
29	29.0	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	29
30	30.0	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	21.0	21.1	21.2	30

EXPLANATION.—In column, beginning with rise of step desired, find height of story, top to top. On a line with this, in column of Risers, will be the No. In column of Treads, the No. is one less than the No. of Risers. On a line with this, in column beginning with width of tread desired, will be the length of run.

124. HOUSE FIXTURES.—I send the following for "Anxious'" benefit. All good houses should be provided with the outfit named in this list:

Water Closets, provided with porcelain drip trays.

Every Fixture is securely trapped and trap-vented, and has safe lined with lead underneath, the drain of which does not connect with sewer.

Iron Drain Pipes, tar coated, with leaded joints, hung on cellar walls, with fresh air inlet at foot and open ventilators above the roof.

Laundries fitted up with patent washtubs.

Wrought Iron Moist-air Furnaces, with automatic water supply.

Hot Air Registers to the fourth floor.

Galvanized Iron cold-air ducts to Furnaces.

Coal and Wood Bins in cellars.

Linen Closet and Housemaid's Sink and Closet in each house.

Speaking-tubes and Electric-Bells throughout the house.

Furnace Flues lined with non-conducting Terra-Cotta pipe.

Bedroom Doors provided with night-bolts as well as locks.

Double Floors, deafened throughout.

All first story fireplaces arranged for open fires, with flues of extra size, and polished brass frames and fenders and tiled hearths.

Yards cemented and carefully drained.

Mirrors over second-story was-basins. BUILDER.

125. SOLUBLE GLASS CEMENTS.—I submit the following for "Neff," which is taken from the *Workshop Companion:*

When finely-pulverized chalk is stirred into a solution of soluble glass of 30° Baumé until the mixture is fine and plastic, a cement is obtained which will harden in between six and eight hours, possessing an extraordinary durability, and alike applicable for domestic and industrial purposes. It may be used for uniting stone, brick, etc., and for filling up cracks. In short, it seems to be applicable to about the same purposes for which plaster-of-Paris is used, but it is much harder and stronger. If for part of the chalk some coloring matter be substituted, differently colored cements of the same general character are obtained. The following materials give good results:

1. Finely pulverized or livigated stibnite (grey antimony, or black sulphide of antimony) will produce a dark cement, which, after burnishing with an agate, will present a metallic appearance.
2. Pulverized cast iron, a grey cement.
3. Zinc dust (so called zinc grey), an exceedingly hard grey cement, which, after burnishing, will exhibit the white and brilliant appearance of metallic zinc. This cement may be employed with advantage in mending ornaments and vessels of zinc, sticking alike well to metals, stone and wood.
4. Carbonate of copper, a bright green cement.
5. Sesquioxide of chromium, a dark green cement.
6. Thénard's blue (cobalt blue), a blue cement.
7. Minium, an orange-colored cement.
8. Vermilion, a splendid red cement.
9. Carmine red, a violet cement. B. J. Z.

126. MORTISE AND TENON.—In making a tenon and mortise in wood let the sectional area of both be equal, but the depth of the mortise should rather exceed that of the tenon, so that the weight may bear on the shoulders and not on the head of the tenon. IBID.

127. NOVELTY SIDING.—This is simply matched stuff, with the face shoulder beveled off from the tongue a half an inch instead of a bead. The back of "novelty siding" is all flush and fair as the beveling is only done on the one side and one edge. J. T. L.

Correspondence.

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor BUILDER AND WOOD-WORKER :

I AM a young man seeking information wherever I can find it. My age is twenty-three ; have been working at the carpenter trade four years and learned very little of its art and mystery ; never had much chance to improve, although anxious. My boss keeps a lot of boys and myself budging joist, laying floors, and other rough jobs that require more strength than brain, so that I become quite disgusted. One of my shopmates advised me to leave. To take this step I thought would be imprudent, as my total ignorance of the trade would soon be discovered, so that I concluded to remain, and, if possible, cultivate my mind by some means, I knew not what, until seeing an advertisement about a BOOK and SLIDE RULE, sent an order to your office for both ; then commenced to study in real earnest.

At first I was a little bothered to know the meaning of the 10th on the A line of the instrument, always being accustomed to measure feet and inches with a common rule. But looking at the beveled edge of the instrument I saw that it was divided into

12ths. Here the whole thing became clear. For instance, if I wished to know what part of an inch is contained in 2½ tenths, simply bring 1 in the middle of slide against 2½ tenths on the A line, then 12 on the slide stood opposite 3 on the A line, which is equal to 3 twelfths, or 3 small divisions on the beveled edge.

Again, what part of an inch on five 10ths? Bring 1 in the middle of slide to 5 on the A line, and opposite 12 on the slide is 6 on the A line, or 6 twelfths, which means half inch or six small divisions on the beveled edge.

What part of an inch is 7 tenths? Bring 1 in the middle of slide to 7 on the A line, and opposite 12 on the slide stands 8 twelfths and four parts, meaning 8 small divisions, four parts of one on the beveled edge.

These simple movements of the slide taught me to read the instrument about the same as reading a book, and now I have no difficulty in solving any problem required in my trade. It was only yesterday that I was making a little brag about what I knew, when a gentleman asked could I give him the exact length of a hoop to go round the sides of an octagon cistern which measured 15 feet across any two of the opposite sides. Without hesitancy I brought 12 on the slide to 5 on the A line, and looking for 15 on the slide found it to stand opposite 6.25 on the A line; thus showing each side of the cistern to measure 6 feet 3 inches. Then bringing 1 on the slide to 6.25 on the A line, and opposite 8 on the slide stood 50 on the A line, or 50 feet as the exact length of hoop.

Here a thought occurred: why not this be applied to laying out octagonal bay windows, instead of using great clumsy drawing boards for merely finding the length of sides, which the slide rule instantly gives in the most direct manner? For example, suppose three sides of a bay window is to occupy a space of 6 feet, and we wish to know the length of each side and projection of window from face wall. To find the answer bring 12 on the slide to 5 on the A line, and opposite 6 on the slide is 2.50 on the A line, or 2 feet 6 inches as length of each side in the octagon. Its projection from face of wall found, by saying 2 feet 6 inches (length of side) equals 30 inches. Then bring 2 in the middle of slide to 30 on the D line and opposite 1 on the slide is 20¼ on the D line, or 21¼ inches as the projection of window.

This latter process being just the same as finding the length of a brace or side of a square by its diagonal, all of which is only the work of a moment by the SLIDE RULE; so that a narrow board is quite sufficient for laying down a plan.

Scores of other practical hints might be stated showing the use and application of the Slide Rule. To any intelligent carpenter the necessity of learning it need not be urged. Mr. Editor, I for one feel proud in having accomplished so much within a short space of time. I can now go ahead, knowing what I am about, asking no odds of any one, as I am qualified to take out quantities, measure up work, value materials, compute interest, and other branches of useful knowledge, all of which I was entirely ignorant of before purchasing the Slide Rule. I do not wish appear to be egotistic in making a display of my newly-acquired attainments, but cannot resist the temptation of showing one or two more examples as further illustration of what the instrument is capable of doing.

Suppose I lend a friend $350 for 12 days without interest, how long should he lend me $200 to repay the favor? To find the answer bring 200 on the slide to 350 on the A line, then opposite 12 the slide is 21 on the A line, or 21 days the answer.

Divide a line 7½ inches long into 18 equal parts. Bring 18 in the middle of slide to 7½ on the A line, then opposite 12 on the slide is 5 on the A line, or 5 twelfths the answer. The proof—set the dividers to 5 small divisions on the beveled edge and it will divide 7½ inches into 18 parts.

If a boy hire for 90 cents a day what should he receive for ¾ of a day? Bring 4 on the slide to 90 on the A line, and opposite 3 on the slide is 67½ on the A line, the number of cents earned by the boy.

If 3¾ pounds of beef steak cost one dollar, how much can you buy for 80 cents? To find the answer bring 3.75 on the slide to 1 on the A line, then opposite 80 on the A line is 3 on the slide, or 3 pounds the answer.

I would like to continue, but am afraid that I have already trespassed too far on the space allowed, therefore I must ask your kind indulgence, this being my first attempt. X. Y. N.

WILLIAMSPORT, Pa.

Editor of BUILDER AND WOODWORKER:

I herewith give you the two principal frames for a "Bank Barn," forty feet wide, and any length. It will also do to build any width on the same principle.

Figure 1 represents the gable end frame; the tie beams should be put in with a lock tennon and a key drove on top, to keep it firm. (See Figure 4, Plate 8.)

The gable end beams should have a king attached to the inside, so as to keep the inside pressure from bulging it out. To do this systematically the beam must be laid with the middle of the beam about two inches higher than the ends, so that when the king timbers are fitted in tight and firmly bolted, and the beam turned over again, so that it will stay concave about two inches, otherwise the king will be of little use, as the inside pressure will soon overcome the king. (See Figure 3 how the king should be made.)

The corner braces in Figure 1 should be made of 2x8, clear and seasoned, so that after they are tightly fitted into the lock mortices they will stay tight. They should also be framed on the inside of the post and sill by using 8x8 posts and sills and 4x4 girts. There will be a vacancy of two inches between the girt and brace in which there should be a piece of 2x4 spiked, and then the brace spiked to that. The run should be 9 feet on sill and 11 on post in the corners on the frame running crossways, and in the corners on the frame running lengthways. The run should be 11 feet on sill and 13 feet on posts. The 4 feet run of braces I don't draw bore. I make them about ¼ of an inch shorter than they should be to fit tight; then after I have the building raised I make a small key and drive it in between the end of the mortice and the brace, the horizontal way, which makes it tight and firm, and I claim that this is better than a draw bore.

Figure 2 represents a middle frame, which has no beams running across from one side to the other; it is clear from the floor to the roof. The building is held together with large tie braces, 3x12, clear and seasoned, and frames with lock mortices and tenons, the mortices should be 2 inches deep on the inside and 2½ on the outside, which will give it a double lock. It also should be notched on the purline post, 2 inches deep, and a bolt put through, and also a bolt through the lower tie. The ends of the braces should be spiked. The upper tie should be framed with lock tenons, as shown in Figure 4. The sills of the middle frames should be well fastened down on to the girders, then there will be no danger of the barn spreading As the basement of bank barns vary so much in construction, and I have so little time at my disposal, that I cannot give more descriptions, as location and materials govern the framing of a bank barn to a very great extent. I may have more to say on this subject in future numbers.

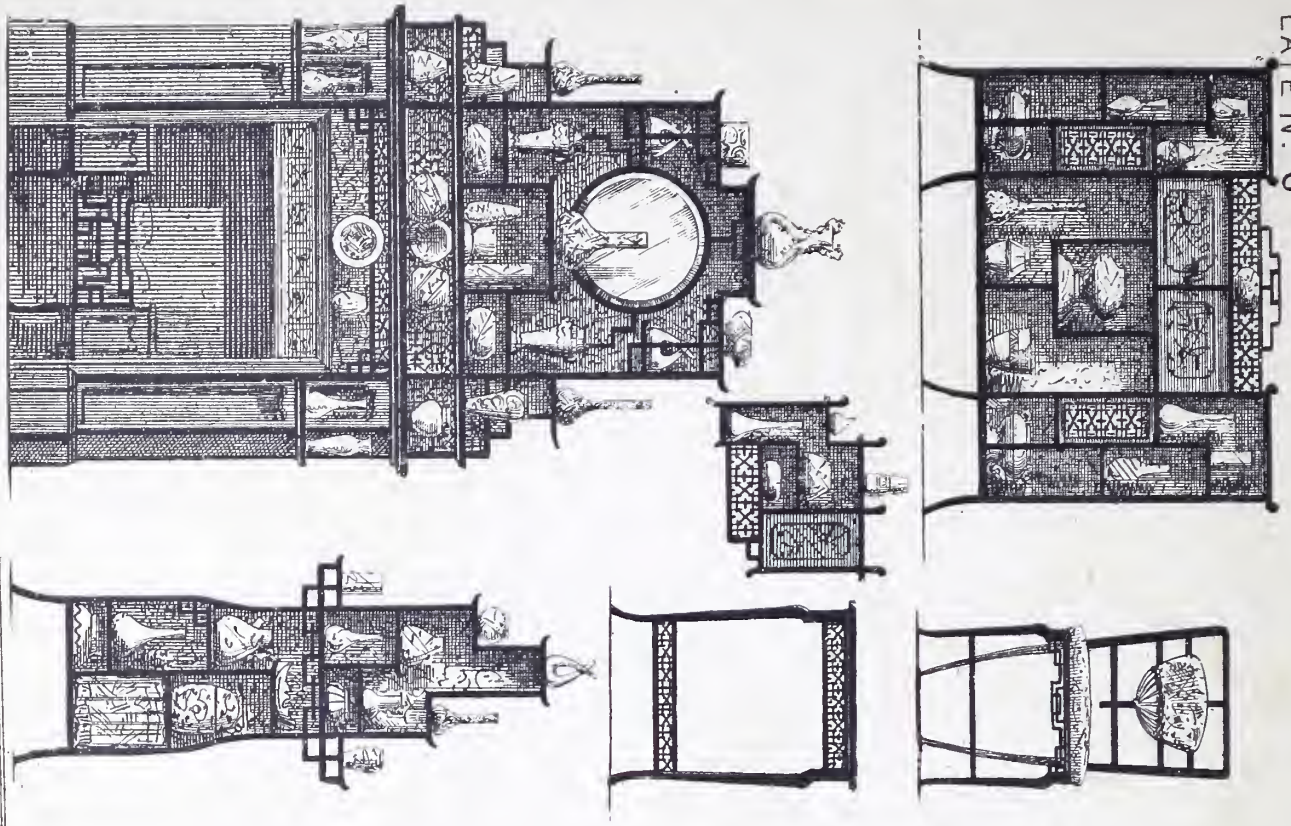
J. B. AYLE.

Letter from Florence, Italy.

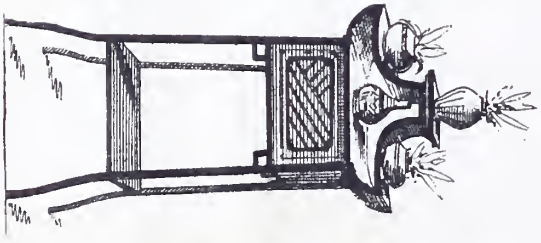
To the Editor of the BUILDER AND WOOD WORKER.

LET me begin this letter by writing of the room where I sit. Doors and sashes are hand-made. The former are of some species of knotty pine or spruce, contain each but one panel, and are stained a rich color, through which the grain is distinctly seen. But I am not sure of the stain; the effect may possibly be got by shellac. The trimmings are unlike any we see at home, and scarcely describable without drawings. The window is about seven feet by four, and opens like a pair of folding doors, a universal form here. The casing at the sides is about two and one-half inches by three, on which the sash is hinged; the inside blinds are hinged on the sash, the rail of the latter being about two and a half inches square. In construction the window frame is first set and the plastering brought up plumb to make a neat job. The door frame is a simple molding, and very pretty, about three by three, inches, finished plumb at one side of the wall. Looking at my door from where I sit, the wall shows fifteen inches, finished in plaster, and painted to resemble stone. The room is papered, and five inches space is left around each door, where there is a light paper border. If I were to lift the carpet—Americans here have carpets, but the Italians get on without them—I would find first a layer of concrete; under the bricks. All floors are constructed of bricks, in arches, thin bricks of, say two inches thickness and 6x12. Hundreds of years ago these people began laying such floors, giving to the arch the smallest possible curve compatible with the degree of strength required; and they must be strong, for one never hears of them giving way. And now here is an article on the wall which deserves attention; it is a picture frame, and illustrates what we have long been trying to impress upon our workers in wood, namely, art that is attainable and profitable. It is a frame carved out of pine and gilded. But it would be beautiful without the gilding, finished in shellac. For a frame take four pieces of pine of reasonable width and thickness, carve and join together when finished. The BUILDER office furnishes all necessary tools. Nor would it be advisable to follow the patterns shown here. Fruits, leaves, ears of Indian corn; there are plenty of patterns always at hand. The carvers, or "sculptors in wood" as they are called here, are very skillful, and turn out work that is not only wonderful to look at but marvelous in price; but then this is the land of low prices. A piece of carving that would cost $300 in New York would wait a customer here a long time for one-third the sum. Our people are getting rich so fast, and so turning their attention to objects of art, that American workmen will find it to their interest, and certainly it will be for their pleasure, to do what they can in meeting the demand made upon them. To learn to carve well in wood is by no means difficult; a good head, time, patience and a will to succeed, are all that is necessary. Now, if I go out of my room to the stairs I shall find everything of stone, save the light wooden rail. Step and riser are of one solid stone, which enters the wall at one side. The outside of this building is

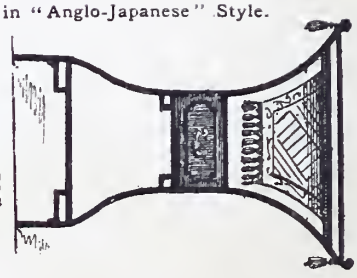
PLATE No. 6



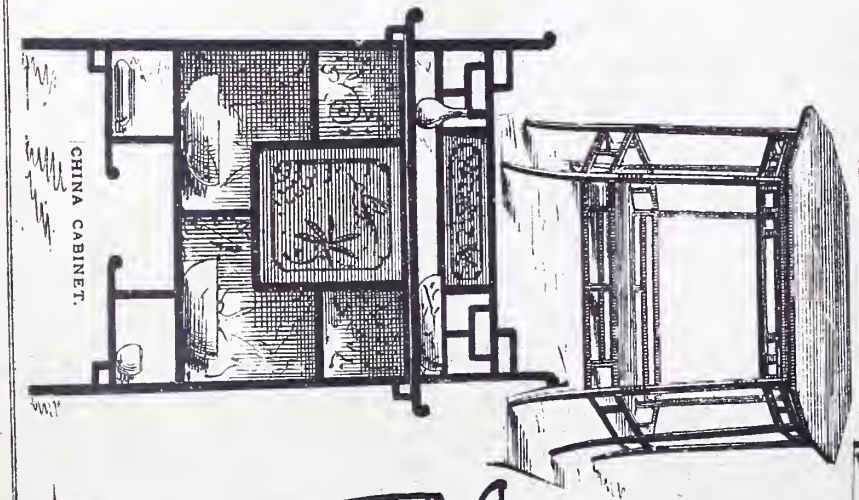
ORIGINAL DESIGNS FOR DRAWING ROOM FURNITURE in "Anglo-Japanese" Style.



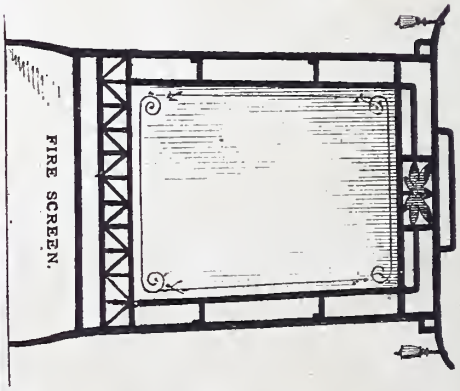
FLOWER STAND WHATNOT.



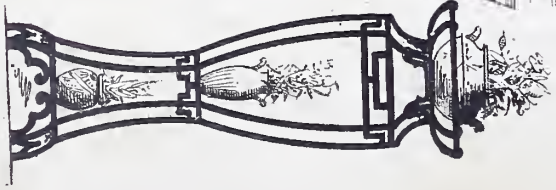
WORK TABLE.



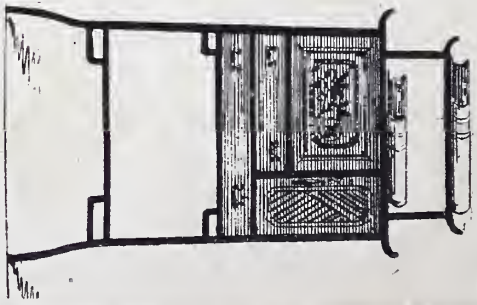
CHINA CABINET.



FIRE SCREEN.



FLOWER STAND.



MUSIC CABINET

SKATE

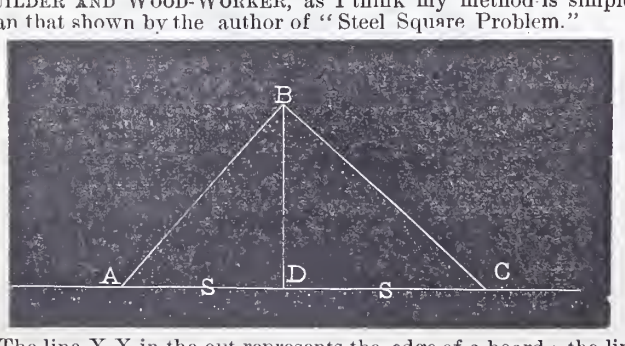
composed of a coat of plaster, and it neither comes off nor does it crack; and it will take fresco and hold it 500 years or more. A wonderful climate this for preserving the work that man performs; seemingly holding it as something sacred, too precious to be destroyed. I saw the other day some rare old frescoes, painted about 500 years ago, and they were still glorious in color; painted in distemper of course, on the plastered wall of an old church. But to return to this building, which, though modern in the order of its construction is little different from those constructed in the neighborhood hundreds of years ago. With its thick walls, brick floors, and lack of a thousand and one conveniences, it is rather a cheerless place to live in; that is to say when one compares it with an apartment in New York. But there is this compensating thought: it is built to stay right where it is until worn out. It will never burn down. If a fire were to be announced up stairs or down, the occupants of this apartment would not budge. They would go on about their business as unconcerned as though the fire were in a distant part of the city. It only costs about twenty cents on the thousand dollars to insure this kind of property, so you can judge for yourself as to the extent of risk.

Although Florence is situated as far north as Boston, the winters are proverbially mild, the Arno seldom freezing; hence it is that one finds an almost entire absence of heating apparatus. In the principal rooms of a house there is, usually, a sort of fireplace or stove, as it is called, for burning wood; but, as wood is worth about $15 a cord, you may judge of the amount of heat to be obtained. People belonging to what we would call the well-to-do class, say the families of tradesmen, do not have fires in winter. For instance, my shoemaker, who has a fine shop, is well dressed, evidently a man quite well off, as we would say, tells me that in his house there is to be found only the kitchen fire, which means a handful of charcoal. Nor does he ever have a fire in his shop. That there must be much discomfort is evident from the fact that some winters ice forms in the Arno to the thickness of six inches. I have not yet experienced an Italian winter, but the conviction is forced upon me that this people, who have taught the world the most it knows about architecture, have nevertheless much to learn about constructing houses that are comfortable places to live in during the winter months. But let me turn the leaf and see how they provide for the summer, in a land where the heat is no more severe than it is in New York; and here they greatly excel us: first, the windows, which are large, and open like double doors; then, the stories are very high; usually a parlor or dining room in a private house, is from twenty-five to thirty feet in height, and one never sees rooms measuring less than fifteen feet in ordinary apartment houses. But one old custom, a very, very old one, I am sorry to see, has not seemed to meet with favor in the building of the last fifty years. I refer to what are called the *loggias* on house tops. The *loggia* is sometimes a sort of large cupola, with many windows, but originally, and generally, a story occupying part of the roof left open at one side. These are very picturesque on some of the old palaces; but think how delightful they must be on such terrific summer nights as we have in New York. The *loggia*, too, on a city house, could be built so as not to show from the street. Well, nothing but fashion has prevented the introduction of the *loggia* in America. I suppose a New Yorker with money enough to build a fine house would not like to confess that he might some time be compelled to spend a summer in this city. But this letter already crowds your space. More anon. C. D. L.

Editor of the BUILDER AND WOOD-WORKER:

The BUILDER AND WOOD-WORKER for October last, contained some problems on the Steel Square by Lucius D. Gould.

Since noticing Mr. Gould's method of getting hopper cuts with the Steel Square, I have given the subject some attention, and with your permission will give the result of my study to the readers of BUILDER AND WOOD-WORKER, as I think my method is simpler than that shown by the author of "Steel Square Problem."



The line X X in the cut represents the edge of a board; the line A B the flare of hopper. Lay the square on the face of the board so that the blade will coincide with flare of hopper A B, then mark by the tongue the line B C, then square from edge of board X X, cutting the angle B.

Now we have a figure that will, when used on the Steel Square give the cuts for a hopper of any flare, either with butt or mitre joints.

To find bevel to cut across face of board:

Take A B on blade and A D on tongue, bevel of tongue is the bevel required.

To find the bevel for butt joint: Take B C on blade and A D on tongue; bevel of tongue is the bevel required.

To find the bevel for mitre joint: Take B C on blade and D C on tongue; bevel of tongue is the bevel required.

I have some other Steel Square problems which I have lately discovered and have never seen used, that I may at some future time send in if you consider them worth inserting in your valuable columns. Yours, L. S.

FALL RIVER, MASS., Nov. 14, 1881.

Editorial Clippings.

A WRITER in a scientific paper points out some of the advantages of double-glazing in promoting the health of homes in winter. Skylights, he says, ought never to be put up unless double or double-glazed. Double-glazing answers perfectly if the sashes are grooved out for glass on each side, and are then glazed with an air-space of one-half inch or more between the panes of glass. The glass must be put in with its inner faces perfectly bright and clean, and the glazing should be done on a cold, dry day, so as not to include watery vapor, which, in cold weather, will condense within the air-space, and cause a mistiness. This double-glazing with an air-space makes a window almost as warm as a brick wall, and not only keeps up the temperature of a room in winter, and saves fuel, but it keeps the room cool in hot weather and makes the temperature more uniform throughout the apartment. With ordinary thin glazing in winter the inmates are always being chilled on that side which looks toward the window, and baked on the side that is toward the fire. Double-glazing our window sashes would save all this trouble.

New Publications.

WE deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

Home Decoration.—By Janet E. Runtz-Rees. Appleton & Co., N. Y., publishers. Price 60.

This is the seventh volume of the "Appleton's Home Books" series, and in point of usefulness is fully equal to any of its predecessors. This volume treats of art needlework and embroidery; painting on silk, satin, and velvet; panel painting and wood carving. The writer does not confine herself to theory, though she gives such general observations as seem to be necessary at the outset of each department of home art work, but most of her directions are direct and in detail. What kinds of materials to use and how to use them are told as briefly and clearly as possible. The work abounds with illustrations, there being no less than 82 of them, and many of them are full-page. These illustrations are pregnant with hints and suggestions on decoration that will surely be of service to the young housekeeper. The last chapter is devoted to amateur carving and gives such instructions for this fascinating art, as the author thinks are necessary to enable the beginner to "rough out" some simple designs. Some of the directions given are well enough in their way, but we think the author falls far short of showing how even amateur work should be done. However, it is not to be expected that a thorough treatise on amateur carving could be crowded in a work of 120 pages, that already contained several full and thorough treatises on other equally interesting matter. We hope that before the series is considered complete, one volume will be devoted altogether to amateur carving. The subject, we think, is sufficiently important to home decorators to demand a volume exclusively.

Home Amusements.—By the author of "Amenities of Home." Appleton & Co. Price 60 cents.

This is the eighth volume of "Appleton's Home Books;" it contains many interesting and helpful hints regarding brain games, garden parties, private theatricals, tableau vivants and other equally amusing matters. Persons possessing the previous seven volumes cannot well afford to do without this, for wherever there are young folks—and we hope they are to be found in every house—the author will be found a very enjoyable companion, when out-door pastimes are not available. Her hints and suggestions regarding the care of birds and other pets are worthy of attention, and her efforts to make some of the duties pertaining to the management of the parlor and kitchen agreeable and pleasant, is one of the chief evidences of the utility of the work. The author has a very pleasing way of presenting her ideas to her readers, this feature only being excelled by the clearness with which she deals with her subject.

Memory Manual.—By George Yule, Lecturer on and teacher of Memory.

Mr. Yule claims in this little book, to teach a system of memory that will enable any one—young or old—to retain words, rules, figures, dates and events in their mind for any reasonable length of time, without the tedious and old-fashioned method of frequent repetition. We believe, after a trial of his method, that Mr. Yule can make good his claim to *improve* the memory, if circumstances are favorable. At any rate the method is so simple and easily followed that any one of average intellect may master it in a day or two.

The Art Interchange for the Holidays, is an exceedingly fine number. We believe this is the only art journal that publishes colord plates from time to

time, and these plates, besides being of value as artistic examples, are a direct attempt to raise the standard of art appreciation among readers by the use of flat tints and simple effects. The colored head accompanying the holiday issue, is an admirable example of the good results within reach by these simple means, and would serve for a handsome wood panel or china plaque. Two pages are devoted to a charming poem called "Courtship," with decorative text and illustrations that treat literally the words of the poem, but in a way that is at once humorous, delicate and pleasing—a difficult matter in art. The number is further enriched by an extra double sheet supplement—a cactus design for a dress front in bead embroidery. These supplements are all full size, and therefore immediately applicable as tracing patterns, if it be desired to work them.

Vick's Floral Guide.—This work is before us, and those who send 10 cents to James Vick, Rochester, N. Y., for it, will be *disappointed*. Instead of getting a cheap thing, as the price would seem to indicate, they will receive a very handsome work of 130 pages, and perhaps 1,000 illustrations—not cheap, but elegant illustrations, on the very best of calendared paper, and as a set off to the whole, two beautiful colored plates that are worth twice the price of the book.

Decorative Art.—We have received an interesting budget of art designs, patterns, etc., from F. A. Whiting, of Plainfield, N. J., and have arranged with him to send a similar assortment, without charge, to every one of our readers who promptly applies, inclosing stamp for return postage. By this arrangement, each of our readers may secure a set of these designs for 3 cents. Mention THE BUILDER AND WOOD-WORKER when you write.

Godey's Lady's Book for January is full of good things. A beautiful steel plate, illustrating the escape of the Countess Isabella from the castle of Schonwaldt, as told by Sir Walter Scott in "Quentin Durward;" a double page design for a window curtain, in colors; the usual rich illustrations of dress for ladies, embracing the very latest fashions; a complete novel by Ino Churchill, entitled "Mock Jewels;" and a goodly collection of shorter stories and miscellaneous original matter. We would suggest to those who do not take it, that the Lady's Book would make a handsome holiday present to your friend. Any of our readers can be supplied promptly, by leaving their orders at this office. We will furnish our own paper and the Lady's Book for the low price of $2.80 per annum. As this issue begins the current year, now is a good time to send in your subscription. The publication office is 1006 Chestnut street, Philadelphia, Pa.

Encouraging Words.

From R. E. E., of Boise City, Idaho.—"THE BUILDER AND WOOD-WORKER is getting better all the time, and in this place is making friends every day. We look upon it as an authority on building matters and kindred subjects, and profit by it accordingly."

A. G. S., Manchester, N. H.—"Your BUILDER AND WOOD-WORKER is the best, plainest in description, and most practical, for this section of the country, of any work I know of, and I have ample opportunity of seeing all papers published in the building interests. $400,000 have been expended in this place on buildings in 1881."

G. L. P., Hartford, Conn.—"By accident I ran across a copy of the BUILDER AND WOOD-WORKER in June, 1880, at a news store, and since that time have taken it regularly. I was so pleased with it that I purchased all the back numbers, and have had them all bound. I have taken pleasure in recommending it to all my friends who are in any way interested in wood-working, and a number of them have subscribed. For this service you are welcome, and I will continue the good work at the same price."

F. S. A., Architect, Streator, Ill.—"Permit me just here to say that the BUILDER AND WOOD-WORKER is the best paper that comes into my office for the money. Its file is indispensible as a work of reference, and I do not feel able to get along without it."

H. C., Builder, Duluth, Minn.—"I cannot let this opportunity pass without complimenting you on your valuable journal, which is proving so useful to the working mechanics of this country. You adopt the correct way of conveying good practical information to your readers."

G. A., Fort Monroe, Va., who sends us four subscriptions, says:—"I have derived a great deal of pleasure from your journal during 1881, and have used quite a number of its designs in amateur wood-work. Others as well as myself have been benefited by it; and that it is appreciated by those who have seen and read it, is shown by the new names I send you, as by the fact of the renewals sent in by your old subscribers at this post."

S. G., Carpenter, Portland, Maine.—"Send me the BUILDER AND WOOD-WORKER for 1882. I must have it. It has done me hundreds of dollars' worth of good."

P. De L., New Orleans, La.—"Please renew my subscription for 1882, and permit me to say that I have taken your paper from the first number, and look upon it as being the best friend I ever had. * * * * A number of my friends here are subscribers, and some of them say that "Our Journal" is the best adapted to their wants and capacities of any paper published."

B J. Z., Civil Engineer, Brooklyn.—"There can be no two opinions regarding the practical value of your paper to the architect, builder, operative mechanic, or amateur wood-worker. Indeed, many of my professional friends in this and other cities agree with me in the opinion that no other paper published on this continent contains so much material, of real practical value, for its price, as your journal. You are doing a good work. May your efforts be crowned with success."—Our readers will notice the initials as being those of our able contributor on the "Slide Rule."

R. N., Builder, Winnepeg, Canada.—"Your paper beats them all. It is a little in advance of what we practice here, but we are creeping up to your standard. Could not think of doing without the BUILDER AND WOOD-WORKER. Send it along for 1882."

G. D., Architect, Montreal, Canada.—"The designs published in your paper have been of very great service to me during the past year, and I deem it but proper on my part to acknowledge the benefits I have derived. You may count me a regular subscriber in the future, as I have been in the past."

G. W. K., Builder, San Francisco, Cal.—"Ten of the names I send you (13) are new subscribers, and without I had had a good paper to show them I could not have induced one of them to take it. Four out of these ten desire that back numbers, as far as you can furnish, be sent them. This, I think, Mr. Publisher, is evidence enough that you publish a paper suitable to the wants of your readers."

J. A. B., of England, and whose initials are those of a gentleman whose name is well known on both sides of the Atlantic, says: "I am so convinced of the usefulness of your paper that I am trying to interest builders in different parts of England in the BUILDER AND WOOD-WORKER. Its freshness, practicability and utility are an immense change from our English and continental publications."

We could extend similar quotations received from our readers from a thousand different points, but we have given enough to show that our efforts during the past five years have not been given in vain.

Chats with Correspondents.

J. B. A., who sends us the drawings for the bank barn, shown on Plate 8 of the present issue, says he will be pleased to correspond with any one who wishes to build a barn similar to the one shown, and will send estimates, bills of material or other information concerning the barn that intending builders may desire. Letters addressed in our care for J. B. Ayle will be promptly forwarded to him.

J. S. K., Burlington.—We cannot do better than refer you J. T. L., whose valuable articles on planing mills appear from time to time in this paper. He is fully competent to advise you on any matters connected with wood-working machinery. We can forward your letter to his address. We think a 20-horse power engine with ample boiler room will be sufficient for your purposes. With regard to a drying kiln, we think that one having 30,000 feet capacity would be large enough for your purposes. Of course, build it of brick; it may cost a little more to begin with, but you can see at once that it will be much better than if built of wood or even concrete.

S. R., Richmond, Va.—We do not know of any other works on the "Steel Square" but the "Steel Square and its Uses" and "Steel Square Problems," that are published in English. There was a small work published in Stockholm, Sweden, some years ago, on the use of a right-angled instrument for the solution of some "difficult problems in carpentry." The work contained nearly all the rules for using the square in obtaining lengths, bevels, cuts, &c., &c.. for rafters, hoppers, hips, &c., that have been published over and over again in this country. If you know of any other work, we should be obliged to you to inform us where we could see or get a copy. As regards veneering, perhaps the following "clipping" will answer your purpose:

"The art of veneering originated about fifty years ago, and was most probably first practiced in England. It originated in the high price of the rare and beautiful cabinet woods. This fact, and the actual scarcity of varities of fine cabinet woods, suggested to some ingenious mind the idea of sawing up the logs of those rare and beautiful woods into thin sheets, and of covering furniture, doors, picture-frames, etc., made of cheaper woods, with these sheets of the rarer lumber, so as to produce the same effect as though the articles were made of solid cabinet woods, thus gaining the appearance without the cost of the more valuable material. It is, in fact, another application of the process extensively used in other branches of the useful arts of covering an inferior material with a superior one, as in gold and silver plating, glass-making, and the like. Though from a rigid artistic stand-point the use of veneers would not be approved, the high utility of the art has made their use absolutely indispensable, and its universal application has largely robbed it of the charge of being an attempt to palm off an inferior article for a superior one. No one supposes, for example, that a rosewood piano is made of solid rosewood; yet the rosewood veneer gives all the artistic effect of that very costly wood.

R. DeLong, Milwaukee.—For ordinary timber bridge construction we do not know of any works that would suit you better than Bell's Carpentry; price, $5; and De Volson Wood's Treatise on the Construction of Roofs and Bridges; price, $3. The Theory of Transeverse Strains, by R. G. Hatfield, price $6, is also an excellent work, and one in which you would find much solid information regarding timber construction.

P. S., Newark.—Your better plan would be to purchase some of the wood-fillers now in the market. You will be able to do work more satisfactory with the preparation named than anything you can improvise. We publish the following, however, which is said to be good by those who have followed it closely: Use boiled oil and corn starch stirred into a very thick paste. Add a little Japan and then reduce with turpentine. Add no color for light ash. For dark ash and chestnut, use a little raw sienna, or walnut burnt umber and a slight amount of Venetian red; for bay wood, burnt sienna. In no case use more color than is required to overcome the white appearance of the starch, unless you wish to stain the wood. This filler is worked with brush and rags in the usual manner. Let it dry forty-eight hours, or until it is condition to rub down with No. 0 sandpaper, without being gummed up, and if an extra fine finish is desired fill again with the same materials, using less oil.

Publisher's Notes.

SPECIAL NOTICES.

☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

FOR clubbing rates, see November number, page X.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881 can now be obtained from this office. Price, $2.50.

ANY one having a complete set of "Knight's Mechanical Dictionary" for sale, cheap, may find a purchaser at this office.

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GRAY spent seven years in perfecting his "Elegy," but the time required to get a box of Esterbrook's steel pens is just long enough to send to the nearest stationer.

F. H. CLEMENT, Rochester, N. Y., is about to bring out a new and improved pattern of jig-saw, having a frame like a band-saw, and cast in one piece, thus giving rigidity and portability without the trouble of changing the counter shaft, etc., as is now the case. Manufacturers who have seen the pattern say it is an excellent thing.

FOR two three-cent stamps we will send "Hints on Estimating," a thirty-two-page pamphlet, containing rules for estimating on the cost of wood, stone and brick work, painting, tinning, glazing, plastering, and general finish about a house. It gives prices of work and materials, including hardware, paints, glass, etc. The best little book of the kind ever published. We send it prepaid for six cents, or two three-cent stamps.

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PLATE No. 8

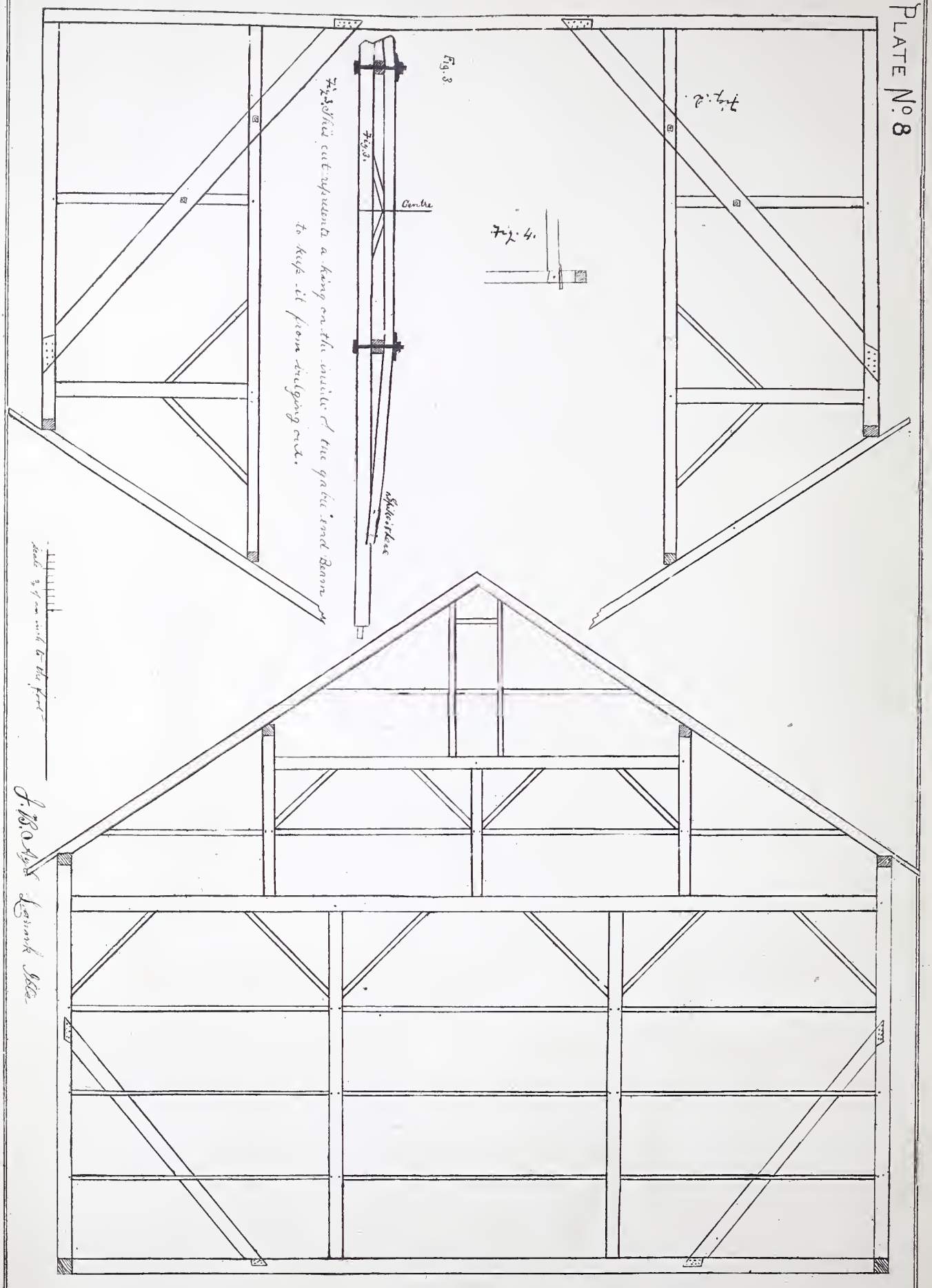
Fig. 3
Fig. 1
Centre
Fig. 4.
Fig. 2.
Fig. 3 Shed cut represents a king cramp on the middle of the gable end Down to keep it from bulging out.
Scale ½ of an inch to the foot
J. B. Ayer Lebanon Me.

ADVERTISER'S INDEX.

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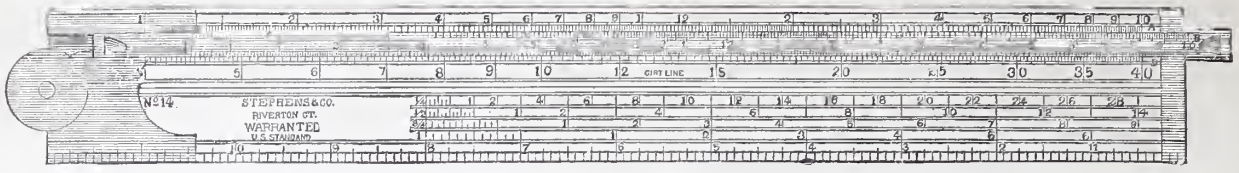

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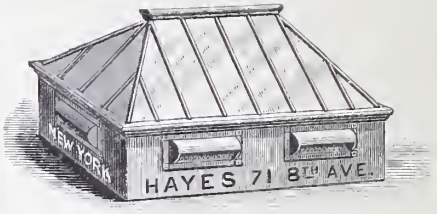

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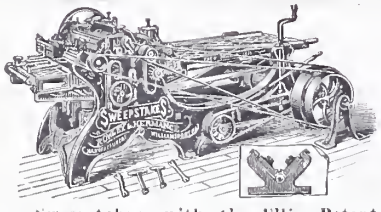

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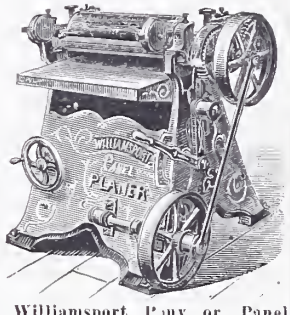

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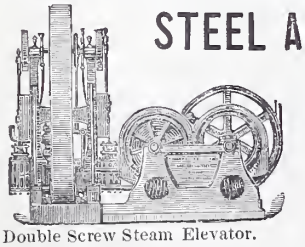

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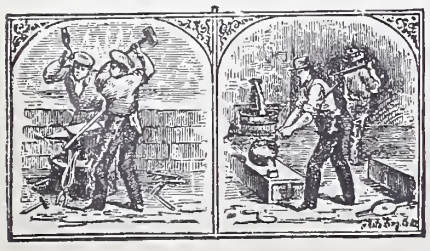

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A JOURNAL OF INDUSTRIAL ART.

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N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } FEBRUARY, 1882. { WHOLE NUMBER, 173 / NEW NUMBER, - 2

OUR Florence (Italy) correspondent made mention, last month, of the strength and durability of Italian buildings and of the lasting qualities of the materials used in their structure. With the Italians and other old builders strength and durability were essential elements in every building, but unfortunately these important items are now deemed non-essentials. Things now are much different, for almost every building is constructed with a view to a sale at no distant period. The lowest bidder gets the contract, and as a matter of course uses bricks which are soft and mortar which never gets hard. We ought not to be surprised when high walls are carried up on slim foundations that they should come down at the first opportunity. So long as builders are obliged to do work for prices a little above the cost of materials, so long will ramshackle buildings be raised and as suddenly tumble.

A LARGE part of the Colosseum in Rome, which was capable of containing 87,000 persons, is still standing and in a good state of preservation, and the part destroyed is said to have suffered more from the hands of men than from the hands of time. The Greeks were particular in having their blocks of stone or marble so nicely squared that cement or mortar was not required to bind them together. Conway says: "The time was when England had a reputation such as no other country at that time possessed, for just one thing, genuineness of work." About twenty-five years ago I was watching some workmen who were pulling down the walls of a old abbey at Reading, which was built in 1121. Tearing down these walls was no easy task on account of the hardness of the mortar. I was curious enough to test its adhesive power, and found it was not so difficult to break the stone as to dislodge the mortar. Eight hundred years ago, men knew how to make mortar, and the cleck of the work was fortunate in not being connected with a department of buildings. Workers in wood in those good old times were as honest as their brethren who worked in stone. During the reign of Richard the Second a new roof was put on Westminster Hall, in London. It was made of chestnut, of one span, and unsupported by a single column, although 270 feet long by 74 wide. John Boterell was clerk of the works. John has been dead 500 years, but the old roof is still doing duty, and is as sound as ever. Modern architects often take a look at the roof, and will not believe that "every generation gets weaker and wiser."

WE are frequently in receipt of inquiries for plans and elevations of houses, mills, factories, etc., etc., which conclude with the remark on a similar one—that the inquirer "is going to build a house, mill or factory, and would like to get something from which to build, without being obliged to employ an architect or engineer." THE BUILDER AND WOOD-WORKER cannot undertake to furnish special designs for each inquirer, this is not its mission; its object is to furnish such designs, hints, and suggestions as may prove useful to the practical workman, amateur, or those who are about to build, and who may select from the designs offered something that nearly corresponds with their wants—or their ideas of what they want—so as to enable them to give their architect something definite to work from. Ordinarily, the man who does his own architectural designing pays dearly for his economy, whether he is constructing a dwelling-house, a store, or any other kind of building, as a good architect earns his fee in the saving of room and the arrangement of conveniences, to say nothing of the beauty and symmetry of appearance imparted by his skill. Persons who do not employ a man whose business it is to design or construct buildings on recognized principles, are generally sorry for it, and soon become convinced that they have wasted good material by throwing it into shape with very little regard to utility and no thought of beauty or convenience. They are seldom candid enough, however, to own up that their mistake was in not employing somebody to do what they ignorantly thought they knew how to do themselves.

REGARDING the tastes displayed in home adornment much has been said: *connoisseurs* of art are ever ready to denounce whatever departs from the principles of truth and beauty, and their labors to effect the adoption of the lines they have laid down for guidance in this respect will, we fear, not produce this desired end until the people have by culture been educated to see the errors in which they have continued so long. Money merely enables us to use better materials and more costly ornament, and thus to dispense with unsatisfactory substitutes; it will never serve to put the impress of our individuality in order, beauty, and grace in our homes. There are plenty of errors in taste to be found in the mansions of the rich, and if wealth cannot do what we require, neither can intellect without special culture. It seems to be often assumed that those who have attained success, and a position in literature, science, or music, have acquired a right to speak with authority on such matters as questions of taste in house adornment, yet most of us are aware that numbers of persons of knowledge and refinement—often, too, admirers of all that is good in art—are apparently content to sit down at home surrounded by ugly form, bad color, and conventional deformity. Many are prone to lay the blame upon the shoulders of manufacturers for tasteless designs and gaudy colors, but forget that the producers place such goods on the market as will appeal to the taste of the hour, and thus find ready purchasers. Bad taste, though apparently intuitive, is mostly perverted taste, depraved by long habituation to evil models, so, when we find manufacturers of our household goods aiming strictly at high art, and attempting to advance the tastes of the people, we consider them worthy of all honor.

IT being generally conceded that prices will be much higher, the question of wages become one of consideration. The cost of living is increasing greatly all over the Northwest, but in no place is it so apparent as in the rushing city of Chicago. The character of the city during the past three years has undergone a great change, or, rather, its growth has been in a different direction. It is now a great manufacturing center, retaining also its former power as a commercial factor. As the furniture interest is now the largest of all the mechanical industries of the city, this question is one of vital importance to manufacturers, and some have been considering the feasibility of moving their factories to the suburban districts beyond the city limits, where taxation is not burdensome, and where land is more plenty and cheaper. Here they propose to erect comfortable cottages for their workmen, and sell on long time, or rent a nominal rates to them, with a view to having their men more satisfied with their condition. This scheme seems to have had favorable consideration from some of the largest manufacturers, and a firm has about decided to locate its factory in the town of Pullman, while another firm has thought of building a factory in the new town of Garfield, where their men will have an opportunity of purchasing their homes, and living much better that they now do in every way. Prices are, also, gradually advancing in the East, and operatives are beginning to get restless under the pressure; already several movements have been made looking forward to increased wages. In Philadelphia the bricklayers have given notice that increased rates will be asked for in July, 1882. This is giving a fair warning, and we hope those concerned may feel able to meet all just demands when the time arrives. We see no reason why furniture men all over the country will not be in a position to deal fairly with their workmen, for, as a rule, trade has been good, continues good, and prices above the average.

Our Lithographic Illustrations.

ON Plate 9 we show a very nice cottage suitable for the South or Southwest. It is compact, yet roomy and convenient.

The drawing was furnished us by S. M. Howard, architect, Wheeling, W. Va.

We have had a number of inquiries lately for designs of plain, cheap country cottages. We think the cottage shown on Plate 10 will meet the wants of most of our inquirers. Where the bay window is considered an objection, on the score of cost, it may be left off and a square bay built where either of the windows now appear. Mr. Howard, the architect, has not advised us as to the estimated cost of the building, but we should think, after a careful examination of the drawings, that it could be built in most localities, where lumber and labor does not command city prices, for about $1,300.

On Plate 11 we show "how a room may be decorated" by the use of simple lines. The drawings, text and ideas are by Luther Hooper, and were designed for and published by the English *Cabinet-Maker*. We give the description in the author's own words :

"To begin, then, the first thing is to consider the space we have to decorate, with regard to its dimensions. The room I am now writing in will suit our purpose as well as another. I find it to be twelve feet square and eleven feet in height ; it also has a large bay window facing the west and letting plenty of light into the room. Having ascertained the measurement, the next thing is to prepare the walls and ceiling for the coloring, and to consider the space to be allotted to each member of the decorative scheme. If the room is in an ordinary middle-class house, there will most probably be a 'horror' in the shape of a 'center ornament' to the ceiling ; this must be removed, as it is sure to be out of harmony with any artistic ornament we may apply. The cornice, too, if floral, must be modified or removed altogether, and a plain, bold molding substituted, if the effect is to be complete, although the speculative builder's cornice is not so certainly objectionable as his center ornament.

"Having thus cleared our way and obtained good flat walls and ceiling to work upon, we must now divide our wall space to the best advantage. The proper place for the most important and richest ornament in a decoration is undoubtedly the frieze. Its claim for space must therefore be considered first. Most people give way to timidity here, and make the frieze too narrow, frequently allowing only six or seven inches for a frieze to a room of eleven feet in height, under the mistaken impression that to put a wider border makes the room appear less lofty. This, however, I have proved by experiment is not the case, but rather, on the contrary, a wide frieze has a tendency to increase the apparent height of any room in which it may be placed. Sixteen inches will be a suitable space to allow for our frieze. At that distance, then, below the cornice a wooden molding, two inches wide, may be run all round the room, and a similar molding placed twenty-eight inches above the skirting board will conveniently form the top or rail of the dado. Our wall is now divided thus :

Skirting board	12	inches.
Dado	28	"
Rail	2	"
Filling	66	"
Molding	2	"
Frieze	16	"
Cornice	6	"
	132	"

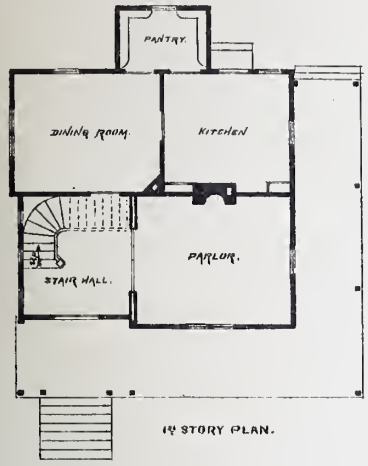
"We have now to determine the coloring of our decoration ; but as the question of color is too wide to consider in the present chapter, I propose, without discussion, to use a coloring which has proved satisfactory in a room having a similar light to the one we are supposed to be decorating ; it is as follows: The woodwork is painted in two shades of a rather light citron green, with the narrow flat portions of the moldings picked out with white. The rail molding is painted with the woodwork light citron, and the dado is colored olive green, several degrees darker than the dark citron of the woodwork. The cornice above and the molding below the frieze are colored white, while the frieze itself is a light tint of peacock blue. The filling is parchment color and the ceiling is a lighter tint of the same. The walls being now colored with these various tints, it only remains to break up the flat surfaces with our decoration of stencilled or painted lines. I give, on plate 11, a sketch of the room as I propose to finish it.

"It would be impossible to find a better or more appropriate 'all-over' pattern for a ceiling than the beautiful arrangement of some simple and plain fret. In order to execute a good clean looking pattern, a stencil plate (fig. 1), accuracy of division and some time and patience on the part of the workman will be required. The ceiling must be first divided into squares of ten inches ; into each of these squares the intersecting portion of the fret is then to be stencilled ; this done, the lines indicated by dots must be painted in by hand to complete the pattern. The whole should be carried out in a darker tint of the ceiling color.

The Assyrian border (fig. 4 in this plate) has suggested the lines of the frieze. To carry out this portion of the decoration a stencil-plate (fig. 2) will be required for the ornament, but the dividing lines and border must be painted by hand. To vary the effect as much as possible, we will make the lines and ornament stand out strongly in white on the peacock-blue ground.

For the filling, the plate fig. 3 must be used in various positions ; some skill will be required here to place it in all directions, so as to get the "all-over" effect shown in the drawing. The difficulty might be lessened by having

PLATE No 9.



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MOUNTAIN LAKE PARK,
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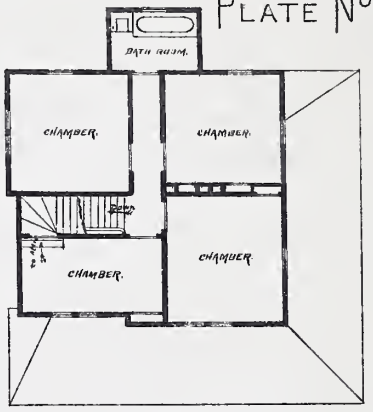


2nd STORY PLAN.

a plate cut containing a group of three or four figures arranged instead of only one, as in the illustration, although I think the best result is to be obtained by using the latter. Any small bare spaces that remain when the space has been covered by the stencil work may be filled in by hand with various-sized dots and circles. It will be seen that the suggestion for the filling, as well as a portion of the frieze, has been taken from a fragment of terra cotta.

The filling should be kept very subdued in color, so as not to interfere with any drawings or objects of art to which it may form a background. Here, again, a darker tint of the parchment color should be used, although the difference between the ground and the pattern must not be so telling as in the ceiling.

The pattern of the dado may with good effect be worked in a rather dark brown upon the olive green. The dividing lines must be set out with care and painted by hand, as may also the alternate small squares between the perpendicular lines. The pattern (fig. 4) then stencilled in the intervening squares will complete the dado.

Having finished the dado, our decoration will be completed, although we have by no means exhausted the material we had to use. I think, if such an experiment was carried out, the result would be a very pleasing and cheerful room, especially if it were furnished in the way indicated in the sketch, and for which furnishing there are such facilities in the present day of artistic furnitnre, decorative crockery, and Japanese and other objects of art, to say nothing of peacock's feathers and artificial sunflowers.

On plate 12 we show a design for a dining-table, by Ed Dewson, of Boston. We also exhibit four European Continental chairs. No. 1 is in what the French call the "Anglais-gothique" style. No. 2 should be built of oak, relieved in ebony, and stuffed in dull crimson velvet. No. 3 is a quaint, comfortable chair, and is especially suited for dining-room purposes. No. 4 is a very fine chair, with a "smack" of the "early English" style about it.

Plate 13 shows a very handsome design by S. N. Small, of Boston, Mass.

On plate 14 we show two designs, one for a "specimen case," and one for a corner cabinet. These designs are by an amateur, who has also executed the work.

Plate 15 also shows a piece of amateur work by the same gentleman.

Plate 16. This plate is reproduced by request of a number of young readers, who do not seem to thoroughly understand the process of dovetailing.

Fig. 1, No. 1, is an elevation of the common dovetail-joint; No. 2, a perspective representation; and No. 3, a plan of the same.

In all the figures, the pins or dovetails of the one side are marked A, and those of the other side are marked B.

Fig. 2, Nos. 1, 2, 3.—In these the lap-joint is represented in plan, elevation, and perspective projection.

Fig. 3, Nos. 1, 2, 3.—In these figures the mitred dovetail-joint is represented in plan, elevation, and perspective projection. The dovetails of the adjoining sides are marked respectively B and C in all the figures.

Fig. 4, Nos. 1 and 2, and Fig. 5, Nos. 1 and 2, show the modes of dovetailing an angle, when the sides are inclined to the horizon, as in a hopper. The pins of the one side are marked A, and those of the other side B, on all the figures.

Planing Mills.

BY J. T. L.

I SELDOM see anything written about "Belting," and I propose to occupy a little of your space by giving my views on the subject.

I know that I shall agree with some and disagree with others, and probably parties are about evenly divided on this one point—which side of the belt is best to run next to the pulley? I am in the habit of putting the flesh next to the pulley when I put on a new belt, for a long experience has taught me that a new belt will pull more with the flesh side next the pulley than the hair or grain side. The way I came to this conclusion was in putting two new belts on the same machine with as nearly as possible the same strain on each, and for fear I might be wrong changing from one side to the other, and putting both belts under the same conditions. This I consider to be the very fairest test I could give them.

I know there is not one machine in fifty that will draw a belt both sides alike. One side will draw on and the other off in almost every machine, and that is the reason why I change the belts from one side to the other to test their pulling qualities, and I have invariably found that a new belt will draw most with the flesh side next the pulley, and when left to use my own judgment in the matter, I always put the flesh side in to start with.

After a belt has been used a while and become pliable by oiling occasionally, I turn it over and use the other side. This gives me the wear of both sides of the belt. I will give you my test of the wearing qualities of belts as it came under my own experience and observation. I was using a heavy machine on nearly all solid oak timber, and we were obliged to work the mill right up to its fullest capacity, running constantly ten hours per day, only stopping long enough to sharpen knives. I put on two new belts off from the same roll, and as near as possible alike; one the flesh side and the other the grain side in, and I could see no difference in the wear of the two after a long, and in this case as nearly as possible, a fair trial. I consider this as fair a test as it was possible to give two things under the very same conditions. I told this to a great advocate of putting the grain side in, and he said there might have been fifty per cent. difference in two belts, but I could not see there was, after examining both very closely to see if there was any difference. I considered it a good test, and hence came to the conclusion that as far as wear was concerned one side was as good as the other to the pulley, and having tried the pulling qualities under the very same conditions, I became convinced that the flesh side of a new belt will pull the most. I don't want anybody to take my word for it, but go through the same process of reasoning I have, viz.: actual experience, and I am sure he will be satisfied with the result. Theory is one thing and actual experience is another. I know all or nearly all belting is riveted to use the grain side in, but if a belt is *well* riveted, the rivets will last as long as the belt does. Some concerns put in iron rivets, dipped in a solution of copper. These do not wear well either side up. I think the best possible way to buy belting for economy is to order from some reliable manufacturer the very best he makes, with no long laps in it, and of even thickness throughout, making a special point in regard to its being of even thickness, for if a belt is of uneven thickness, unless it is very tight, it flaps up and down every time the heavy part comes round, and will not do near as good work as if it was of uniform thickness the whole length.

A belt should be balanced, so to speak, as well as the machinery which it drives. Furthermore, belting should be well stretched before being put on. The annoyance of stopping to take up a new belt every little while is very unpleasant, and when we come to take into account the loss of time and cost of lacing or other appliances for putting a belt together, it amounts to a considerable sum before a belt is thoroughly stretched. If this was applied to some very simple plan to stretch a belt all it ought to be before it is put on, much would be saved not only in time but money directly.

One advantage gained in ordering a first quality belt made for the special place wanted, and being uniform throughout, is, that it will be straight, which a great many times is wanting in those taken from a large roll, and if anything is unpleasant it is to see a belt going over a pulley like a letter S.

There are so many methods, patent and other ways, of fastening a belt, that any advice would be almost superfluous. I will give my views on the subject, however, and then each one may do as he pleases. I saw some time ago in the BUILDER AND WOOD WORKER advice from a man who said a good lacing was the best way of mending a belt. I say it is a good thing if there is only one lacing in a belt, but very expensive if more than one. If more than one scarf, glue and rivet, by all means, and if a belt can be well stretched before being put on, I would say scarf and rivet without glueing, because one joint so riveted will outlast a great many laced or hooked joints. I should do this to all heavy belts any way. If anybody will just try scarfing and riveting his cylinder belts, he will be more than satisfied, and will eventually scarf and rivet all his belts; and as far as economy is concerned, I think riveting is cheapest. But whatever you do never have but one open joint. On light belts I like Blake's belt studs as well, if not better, than anything I have ever used. With them a belt runs very evenly over a pulley (if properly put in), and unless a belt is very tight, will outlast a great many lacings, besides having the advantage of being used over and over again, thereby making them a great deal cheaper than lacing. The flat steel hook has an advantage over a heavier class of belting than I would like to use, Blake's studs in, hence there is in my mind no direct competition between them. If I used lacing, I would in all cases, light or heavy belting, use two rows of holes directly opposite each other, with a single lace in

each hole. A belt is very much less liable to tear out the holes in this way than where a single row of holes are used and a double lacing put in. I will tell you the way I lace with two rows of holes. Put the belt together and pass the lacing down through the inside holes, or the holes nearest the end, then pass up through the outside, and in going to the next row pass down through the inside holes again, and, as before, up through the outside ones, and so on till the belt is finished. Stop the ends well, and this style of lacing will give you good satisfaction. In closing this article let me say, it is great economy to buy the very best you can find, and, greater still, to order of good reliable manufacturers the best that they make. I consider the raw-hide lacing furnished by Lovejoy, of Lowell, Mass, the best in market.

The Stability of Structures.

BY F. E. KIDDER, B.C.E.

III.

FOUNDATIONS ON PILES (*Continued*).

EXAMPLE of pile foundation. As an example of the method of determining the necessary number of piles to support a given building, we will determine the necessary number of piles to support the side walls of the warehouse (of which a vertical section is shown in the figure 1). The walls are of brick, and the weight may be taken at 110 pounds per cubic foot of masonry.

The piles are to be driven in two rows, two feet on centers, and it is found that a pile 20 feet long and 10 inches at the top will sink 1 inch under a 1,200 lb. hammer, falling 20 feet after the pile has been entirely driven into the soil. What distance should the piles be on centers lengthwise of the wall?

By calculation we find that the wall contains 157 1-3 cubic feet of masonry per running foot, and hence weighs 17,306 lbs.

The load from the floors which comes upon the wall is:

From the first floor	1,500 lbs.
" " second floor	1,380 "
" " third floor	1,380 "
" " fourth floor	790 "
" " fifth floor	720 "
" " sixth floor	720 "
" " roof	240 "
Total	6,730 lbs.

Hence the total weight of the wall and its load per running foot is 24,036 lbs.

The load which one of the piles will support is, by Sander's rule,

$$\frac{1200 \times 240}{8 \times 1} = 36{,}000 \text{ lbs.}$$

By Trautwine's rule, using a factor of safety = of 3 the safe load would be

$$\sqrt[3]{\frac{20 \times 1{,}200 \times 0.23}{2 \times 1 + 1}} = 18.63 \text{ tons.}$$

or 41,730 lbs.

Then one *pair* of piles would support 72,000, or 83,460 lbs., according to which rule we take.

Dividing these numbers by the weight of one foot of the wall and its load, we find that by Sander's rule 1 pair of piles will support 3 feet of the wall, and by Trautwine's rule 3½ feet of wall; hence the piles should be placed 3 or 3½ feet on centers.

In very heavy buildings heavy timbers are sometimes bolted to the tops of the piles, and the foundation walls built on these.

In Boston, Mass., a large part of the city is built upon made land, and hence the buildings have to be supported by pile foundations. The building laws of the city require that all buildings "exceeding 35 feet in height shall have not less than two rows of piles under all external and party walls, and the piles shall be spaced not over three feet on centers in the direction of the length of the wall."

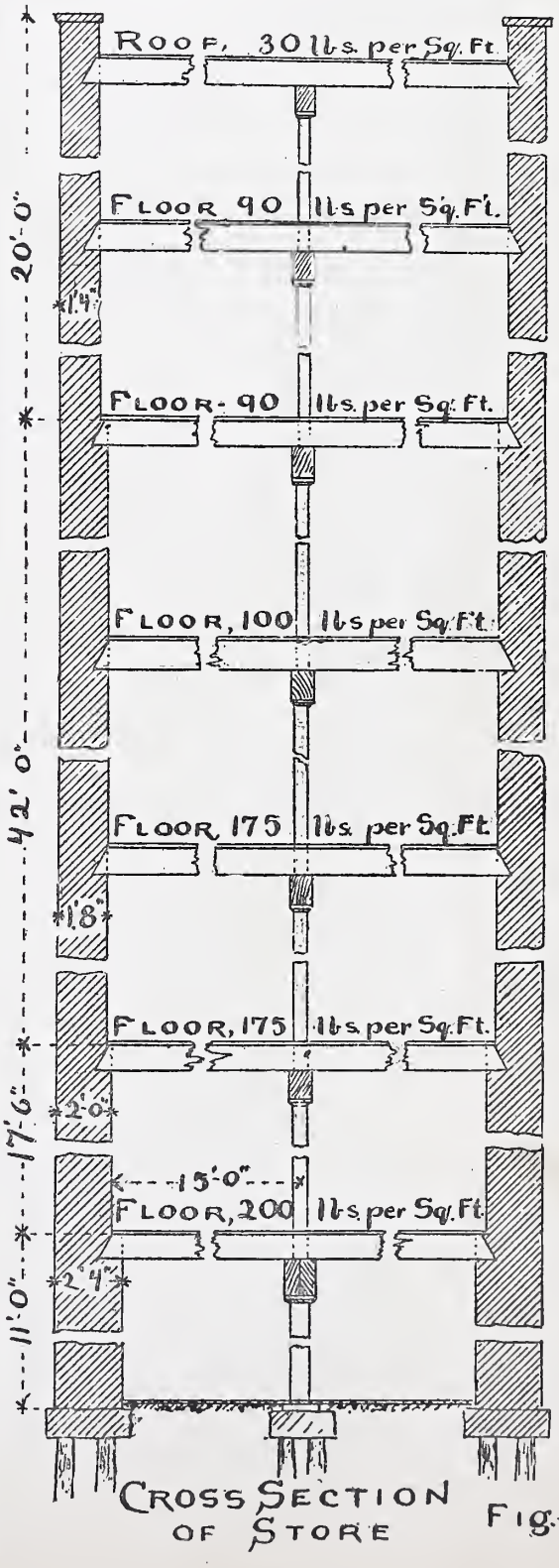
As an example of the load which ordinary piles in the made land of Boston will support, it may be stated that the piles under Trinity Church, in Boston, support 2 tons each, approximately.

For engineering works various kinds of iron piles are used; but they are too rarely used for foundations of buildings to come within the scope of these articles. For a description of these piles the reader should consult some standard work on engineering. A very good description of iron piles is given in *Wheeler's Civil Engineering*, and also in *Trautwine's Hand-Book*.

PLANKING FOR FOUNDATION BEDS.

In erecting buildings on soft ground, where a large bearing surface is required, planking may be resorted to with great advantage, provided the timber can be kept from decay. If the ground is wet and the timber good, there is little to fear in this respect; but in a dry situation, or one exposed to alternations of wet and dry, no dependance can be placed on unprepared timber. There are several methods employed for the preservation of timber, such as kyanizing or creosoting, and the timber used for foundations should be treated by one of these methods.

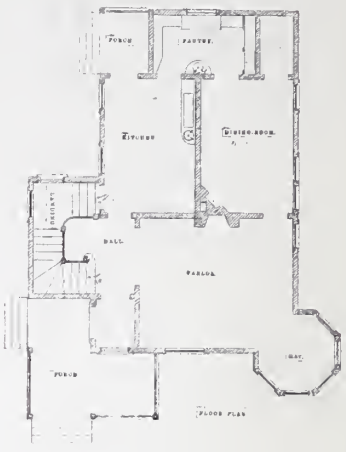
The advantage of timber is that it will resist a great cross strain with very trifling flexure, and therefore a wide footing may be obtained without any excessive spreading of the bottom courses of the masonry. The best method of employing planking under walls is to cut the stuff into short lengths, which should be placed *across* the foundation and tied longitudinally by planking laid to the width of the bottom course of masonry in the direction of the length of the wall and firmly spiked to the bottom planking. Another good method of using planking is to lay down sleepers on the ground and fill to their top with cement, and then place the planking on the level surface thus formed. For the cross timbers 4 inch by 6 inch timber, laid flatways, will answer in ordinary cases.



CROSS SECTION OF STORE

Fig. 1.

PLATE No. 10



FRONT ELEVATION

A COUNTRY COTTAGE.

GEO. O. WOODCOCK, ARCHT., CLAREMONT, N. H.

SIDE ELEVATION

DECORATIVE ART.

HOW TO DECORATE A ROOM WITH "SIMPLE LINES."

By LUTHER HOOPER

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

PLATE No. 11

WALLS.

FOOTING COURSES.

In commencing to lay the foundation walls of a building it is customary to spread the bottom courses of the masonry considerably beyond the face of the wall, whatever be the character of the foundation-bed, unless, perhaps, it be a solid rock-bed, in which case the spreading of the walls would be useless. These spread courses are technically known as *footing courses*. They answer two important purposes :—

1st. By distributing the weight of the structure over a larger area of bearing surface, the liability to vertical settlement from the compression of the ground is greatly diminished.

2d. By increasing the area of the base of the wall, they add to its stability and form a protection against the danger of the work being thrown out of "plumb" by any forces that may act against it.

Footings to have any useful effect must be securely bonded into the body of the work, and have sufficient strength to resist the violent cross-strains to which they are exposed.

FOOTINGS OF STONE FOUNDATIONS.

As the lower any stone is placed in a building the greater the weight it has to support, and the risk arising from any defects in the laying and dressing of the stone, the footing courses should be of strong stone, laid *on bed*, with the upper and lower faces dressed true. By laying *on bed* is meant laying the stone the same way that it layed before quarrying.

In laying the footing courses no back joints should be allowed beyond the face of the upper work, except where the footings are in double courses, and every stone should bond into the body of the work several inches at least.

Unless this is attended to the footings will not receive the weight of the superstructure, and will be useless, as is shown in Figure 1.

In proportion to the weight of the superstructure, the projection of each footing course beyond the one above it must be reduced, or the cross-strain thrown on the projecting portion of the masonry will rend it from top to bottom, as shown in Figure 2.

Fig. 2

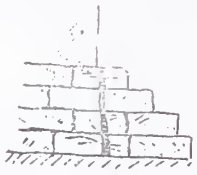


Fig. 3

In building large masses of work, such as the abutments of bridges and the like, the proportionate increase of bearing surface obtained by the footings is very slight, and there is generally great risk of the latter being broken off by the settlement of the body of the work, as in Figure 3. It is therefore usual in these cases to give very little projection to the footing courses, and to bring up the work with a battering face or with a succession of very slight setoffs, as in Figure 4.

Fig. 4

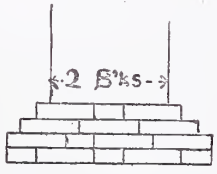


Fig. 5

Footings of undressed rubble built in common mortar should never be used for buildings of any importance, as the compression of the mortar is sure to cause movements in the superstructure. If rubble must be used, it should be layed with cement mortar, so that the whole will form a solid mass; in which case the size and shape of the stone is of little consequence.

In general, footing stones should be at least 2 by 3 feet on the bottom, and 8 inches thick.

The Building Laws of the city of New York require that the footing under all foundation walls, and under all piers, columns, posts, or pillars resting on the earth shall be of stone or concrete. Under a foundation wall the footing must be at least twelve inches wider than the bottom width of the wall, and under piers, columns, posts or pillars, at least 12 inches wider on all sides than the bottom width of the piers, columns, posts or pillars, and not less than 18 inches in thickness, and if built of stone, the stones shall not be less than two by three feet, and at least 8 inches thick.

All base stones shall be well bedded and laid edge to edge; and if the walls are built of isolated piers, then there must be inverted arches, at least 12 inches thick, turned under and between the piers, or two footing courses of large stone at least 10 inches thick in each course.

The Boston Building Laws require that the bottom course for all foundation walls resting upon the ground shall be at least 12 inches wider than the thickness above given for the foundation walls.

FOOTINGS OF BRICK FOUNDATIONS.

In building with brick, the special point to be attended to in the footing courses is to keep the back joints as far as possible from the face of the work, and in ordinary cases, the best plan is to lay the footings in single courses; the outside of the work being laid all headers, and no course projecting more than ¼ brick beyond the one above it, except in the case of an 8 inch wall.

Figs. 5, 6, 7 and 8 show footings for walls varying from 1 brick to 3 bricks in thickness.

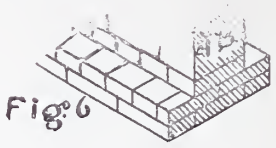


Fig. 6

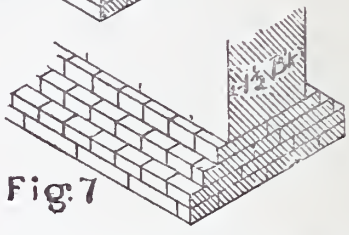


Fig. 7

The bricks used for footings should be the hardest and strongest that can be obtained. The bottom course should in all cases be a double one.

"Too much care cannot be bestowed upon the footing courses of any building, as upon them depends much of the stability of the work. If the bottom courses be not solidly bedded, if any rents or vacuities are left in the beds of the masonry, or if the materials themselves be unsound or badly put together—the effects of such carelessness are sure to show themselves sooner or later, and almost always at a period when remedial efforts are useless."

INVERTED ARCHES.

In structures where the weight of the superstructure is sustained by a number of piers, it is often advantageous to connect the base of the piers by means of inverted arches, as they serve to distribute the weight of the structure evenly over the foundation bed.

The form of the arch is commonly that of a semi-ellipse, or approaching to it.

The arches if of brick should be at least 12 inches thick.

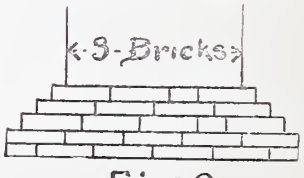


Fig. 8

In using inverted arches, care should be taken that the outer arches have sufficient abutments, otherwise the thrust of the arch may push the wall against which it abuts out of a perpendicular.

FOUNDATION WALLS.

Foundation walls should start below the reach of frost, and should be carefully bonded together and made as solid and compact as possible.

The bottom courses are often laid dry, and the remainder in cement mortar. If made of stone they should not be less than 20 inches thick, and if of brick never less than 12 inches in thickness. In ordinary foundations it is only necessary to provide a wall that shall not be crushed by the weight of the superstructure. The working strength of the foundation wall can easily be determined by multiplying the area of its upper surface in square feet by 6 tons for brick-work, 2½ tons for common rubble, and for good coursed rubble, by $\frac{1}{15}$ of the crushing strength of the stone it is built with.

For wooden buildings, an eighteen or twenty inch rubble wall, or twelve inch brick wall is generally used.

In soils of sand, gravel, or loam, the wall is generally built with both sides vertical; in clay soils either the inside or outside of the wall is generally battered.

In such a case it would of course be better to batter the wall on the inside, if the room is of no object.

For brick and stone buildings, the foundation walls are generally from 8 to 12 inches thicker than the wall next above them.

In New York city the laws require that all foundations shall be built of stone or brick, laid in cement morter.

Stone foundations shall be at least 8 inches thicker than the wall next above them, to a depth of 16 feet below the curb level, and shall be increased 4 inches in thickness for every additional five feet in depth below the said sixteen feet. Foundations of brick shall be at least 4 inches thicker than the wall next above them to a depth of sixteen feet below the curb level, and shall be increased four inches in thickness for every additional five feet in depth below the said sixteen feet.

The Boston building laws make the following requirements in regard to foundations.

DWELLING HOUSES.

Dwellings not exceeding 35 feet in height, the foundation walls, laid with block stone with horizontal courses, or with brick in cement, shall not be less than 16 inches thick. Walls exceeding 35 feet, and not exceeding 55 feet, foundation walls, if of block stone, not less than 18 inches thick, and if of brick, not less than 16 inches thick and laid in cement.

Walls exceding 55 feet in height, foundation walls, laid with block stone or cement, not less than 20 inches thick.

Foundation walls laid with irregular rubble work, shall be one-fourth greater in thickness than that required for block stone walls.

BUILDINGS OTHER THAN DWELLING HOUSES.

Walls not exceeding 35 feet in height, foundation walls shall be of block stone in horizontal courses not less than 24 inches thick.

Walls exceeding 35 feet in height, foundation walls of block stone, not less than 28 inches thick.

Foundation walls of buildings other than dwelling houses, and not exeeeding 35 feet in height, in the city of Boston, may be built of irregular rubble stone, one fourth thicker than block stone walls; *provided* that when such foundation walls are laid on piles, the lower course shall be of block stone.

Intercommunication.

THIS department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Queries.

13. BRICK COTTAGE.—Will some of your clever contributors—Mr. Hopkins, Mr. Dewson, Mr. Angell, or Mr. Howard—kindly publish a design for a neat brick cottage, suitable for a village or country town, and to cost about $1,500.—G. A. Z.

14. CAR BUILDING.—I should feel obliged if some competent person would answer the following questions: 1st. Is the business of manufacturing box, freight, and platform cars overdone? 2d. Can cars of the above kind be built cheaper where iron is abundant than where it has to be imported? Where can I procure works, books, etc., upon car building.—H. E. W.

15. TOOL CHEST.—Would some friend give me some illustration as to how to make the most convenient tool chest for framing and joining tools.—J. B. A.

16. SLIDE RULE.—Would some reader of the BUILDER AND WOODWORKER be so kind as to tell me whether there is more than one kind of slide rule, and, if so, which is the best, and what number.—J. B. A.

17. BOOKS.—As I am desirous of getting a work treating on architectural instructions, I would like if some experienced friend would inform me through the BUILDER AND WOODWORKER what work would suit my experience the best. I have all the experience needed on barn-building, but not much on house-building. I would like something that treats on country and village houses in plain terms.—J. B. A.

18. WOOD-FILLING.—What is the proper way to fill and polish wood of all kinds.—CRIPPLE.

19. RISES AND TREADS.—Will the person sending the table of rises and treads last month to the BUILDER AND WOODWORKER please give an explanation of how the table is operated? I cannot understand it without further explanation.—BLOCKHEAD.

20. BAKER'S OVEN.—I would consider it a favor if some brother reader would give a description of the best method of building a baker's oven. I intend to build a brick oven about 14 by 14 feet, and would like to have the opinion of a competent man.—MASON.

21. COVERING DESKS AND TABLES WITH CLOTH.—I should very much like to know how to make the paste, glue, or mucilage that cabinet-makers use when covering desks and tables with cloth, leather, or enameled cloth.—AMATEUR.

22. GILDING.—I should like to know if good gilding can be told from bad, and how?—HOAXED.

23. WALNUT STAIN.—I want a reliable receipt for making a walnut stain for pine or white wood. Is there such a thing in existence? If so, I would like to see it, as I believe there are about 100,000 receipts that are unreliable.—DOUBTFUL.

24. GLAZING.—Will some person who knows, inform me which is the best way to put in glass—to bed in with putty, or back it in.—J. L. N.

We notice that several of the foregoing querists seem to think that it is a favor to them to be permitted to ask their questions in this department. Now we wish all our readers to understand that we consider it a favor to us to be permitted to publish their questions. We are always pleased to publish these questions, and are equally glad to receive replies to them. The more questions we get the more we like it.

Answers.

WE wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

1. PLACING BRACKETS.—When brackets are placed in pairs, it is usual to place a pair over each post or standard, and as a matter of course it would take one or two pairs on the corner, according to the way the posts are divided. If, as R. E. E. says, there are three posts, then there should be four pairs of brackets; if there is only one post on the corner, then two pairs of brackets are all that will be required. If the brackets are put up singly, then each one will take the place of each pair on the corner.—NEFF.

2. COST OF BUILDING.—General or approximate cost of buildings per cubic foot, as architects estimate it: Cottages, factories, and workshops cost about 9 cents; small country house and middle class houses 12 to 18 cents; mansions, mainbuilding, 22 to 35; mansions, servants' quarters, stables, etc., 12 to 22; churches and chapels not less than 13; lunatic asylums, work houses, and the like, 15; town-halls, law courts, and such that corporations build for our use, over 25. For my part, however, I would not care to take any building costing over $500, for sums obtained by this mode of estimating.—NERA.

3. STAIN.—Take 1 quart of alcohol, 3 ozs. of ground turmeric, 1½ ozs. of powdered gamboge. When this mixture has been steeped to its full strength, strain through fine muslin. It is then ready for use. Apply with a piece of fine sponge, giving the work two coats. When it is dry, sandpaper down very fine. It is then ready for varnish or French polish, and makes an excellent imitation of the most beautiful satinwood.—GAUGE.

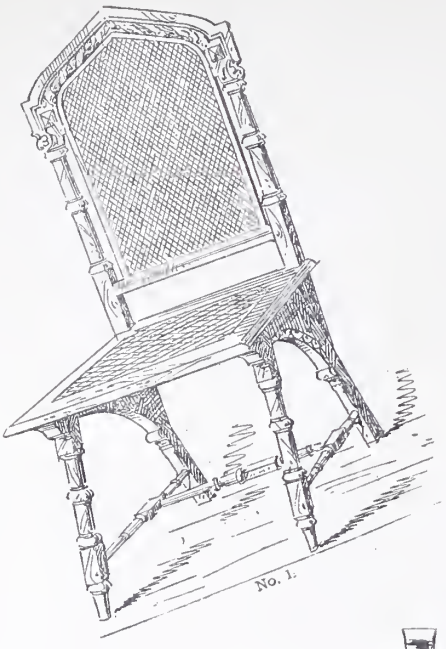
4. STEEL SQUARE.—Steel squares, such as "countryman" asks for, may be obtained from Chas. E. Little, 59 Fulton street, New York, N. Y.—NEFF.

6. FILLING.—This question has been answered many times in the BUILDER AND WOOD-WORKER, in one way or another, but I don't remember of having seen the following receipt. If Z will try this one, I think he will be pleased with it. Take one quart of boiled linseed oil, one quart of spirits of turpentine, and the same quantity of Japan dryer, then mix with 1½ pounds of corn-starch. Apply to the work with a good stiff brush; when nearly dry but not sticky, rub off with a clean cloth, after which let stand until it is hard dry, then rub down and varnish or polish as may be required.—NEFF.

7. INFORMATION.—In answer to H. F. Powell, I may say, that after an experience extending over thirty years as a draftsman, I have come to the conclusion that: 1st. A good bookkeeper gets better paid, in the long run, than a good draftsman. 2d. The pay of a good draftsman ranges from two to eight dollars per day, according to location and character of work. 3d. Enter an architect's or engineer's office for two or three years, giving your services in return for instruction. 4th. No. 5th. Sometimes. A knowledge of algebra, plain and solid geometry, plain trigonometry and conic sentences, is all very well, but there are many other things besides these required to make a first class draftsman. Temperance, industry, originality, and constructive ability, are just as necessary qualities in the make up of a good draftsman as a knowledge of all the physical sciences.—H. WEITZ.

8. BUILDING CONSTRUCTION.—"Practical Builder" need have no fear in investing his $13.50 on the three volumes of *Notes on Building Construction*, as I am sure he will find them superior, for practical purposes, to anything he ever purchased in the shade of books on building. They treat on the theory and practice of con-

PLATE Nº 12



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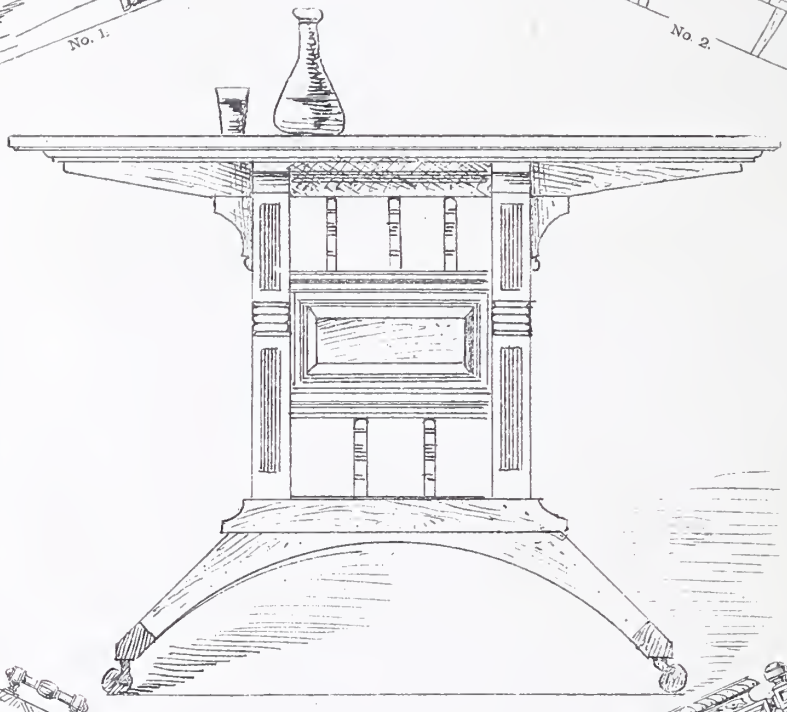
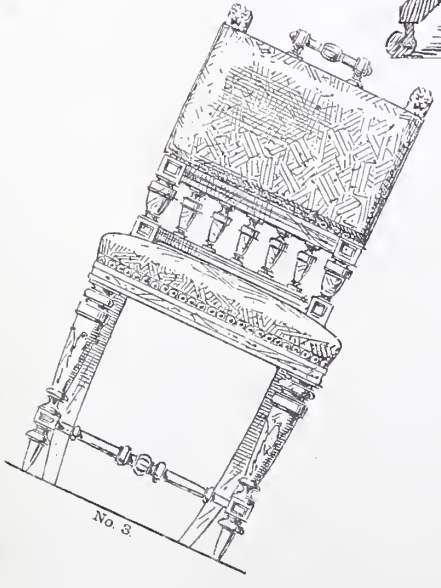


DINING-ROOM TABLE.



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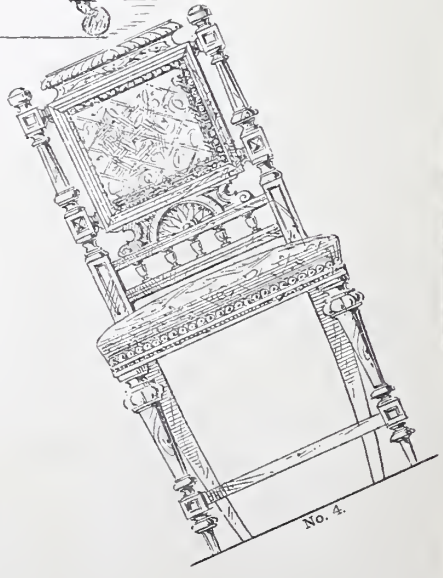

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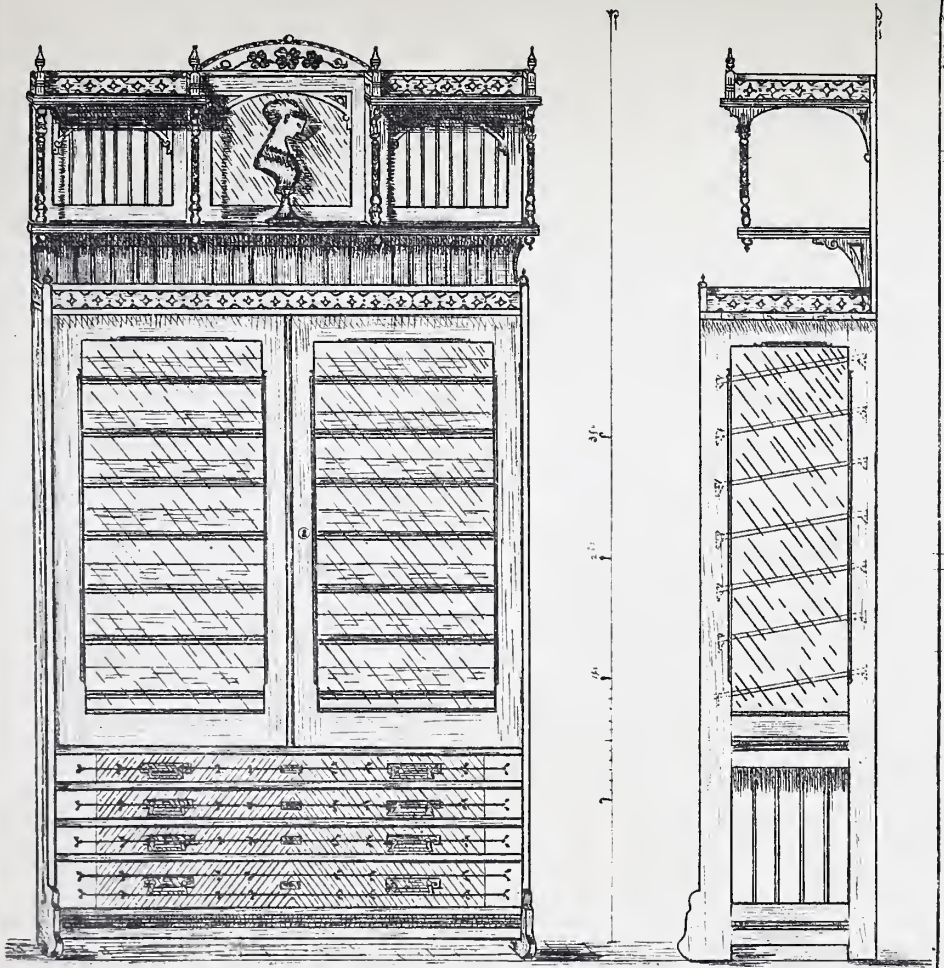
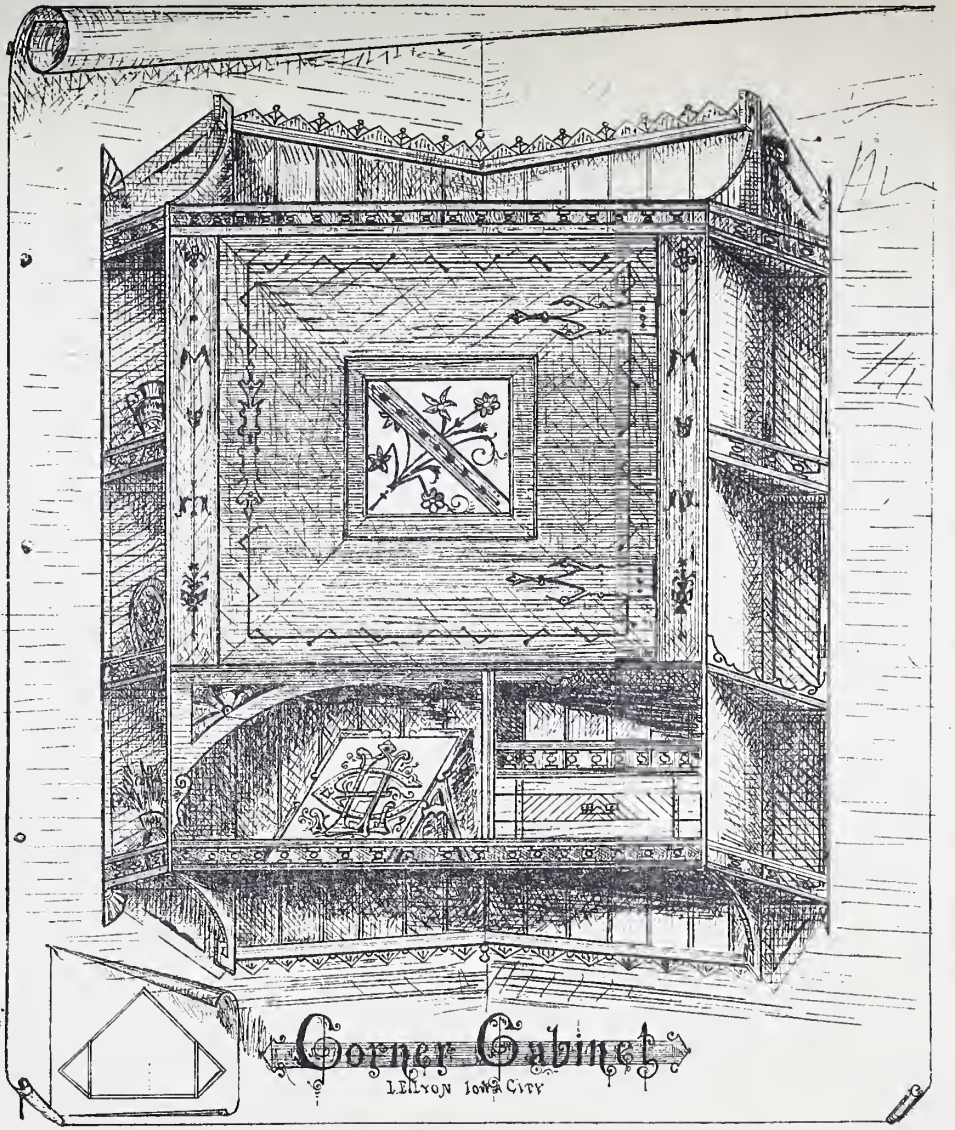


Specimen Case & Drawers. By L. C. L. Iowa City.



Corner Cabinet

L. Ellyon Iowa City

struction in wood, iron, brick, stone and concrete, giving rules, stated methods and manner. The strength, chemical qualities, adaptation and durability of materials used. Paints, glass, limes, slate, and every other material used in buildings of any kind, are described and discussed in a common sense practical way. Plumbing, drainag and every thing required to be known concerning the completion of a building receives a fair amount of attention. The volume sare copiously illustrated with excellent engravings throughout, and the whole work is full of good, useful and practical information.—BUILDER.

9. SAWS.—Eight teeth to the inch on a cross-cut saw is the best number for general purposes.—J. Z. N.

9. SAWS.—Try eight teeth to the inch. I find this number to answer best for general purposes. "Holly's Saw Filing," price 75 cents, is the best book on saw filing I know of.—NEFF.

11. HAND RAILING.—I have put up several "rails" of "black birch" and find it works very nice. It has a very fine grain, and if well seasoned will uot warp or twist out of shape. K should not use the wood unless perfectly dry. It makes handsome balusters. The wood grows darker with age.—DETROIT.

11. HAND RAILING.—If "K" gets good dry "black birch," he ought to be able to make as good and as handsome a rail as though he made it of mahogany or walnut. Black birch works nice in the lathe, and can be finely polished.—STAIR BUILDER.

12. WEATHER BOARDING.—The name of the tool "Cripple" speaks of, is called in this State (Indiana), "Jack" or "Siding Hook."—J. Z. N.

The Building Trade—Its Conditions and its Profits.

BY AN OLD BUILDER.

IF I were asked to name a business which requires for its proper conduction the possession—in a degree equal at least to that of any other business—of capital, energy, patience, experience, and technical ability, I should certainly name the building trade; if I were desired to name a business in which the profits to be realized were in the least proportionate to the amounts turned over and the risks incurred, I should have no hesitation iu adhering to my first selection; and if I had to repeat all I know conceruing the amount of capital with which many builders do commence iu business, the narrow limit of knowledge which many possess, and the loose, reckless way iu which they enter into large and important contracts, it is more than possible I should not be believed. If I were to go still further iuto this questiou, and give out a few facts of which I am aware concerning the ways and doings of speculative builders and their intimate connections—loan societies and building clubs—it is possible that I should be advised to confine my attention to the writing of pure romance, and not to enter within the prosaic limits of a trade essay; and yet what might be regarded by some as being little better than romance must have, I feel snre, entered upon the experience of others as a conviucing and most disagreeable fact.

I regard the building trade as being one which is sharply divided into two divisions—building by contract and building upon speculation. Sometimes a builder assimilates the two; but this is not the rule; and when the assimilation takes place it rarely happens that the contracting party can hold to its existence amid the seductious aud entauglements of the speculative portion.

I decide to consider the position of the contracting builder the first, for the reason that I regard his business as being the more legitimate of the two.

It would, of course, be a very ridiculous thing to snppose for a momeut there did not exist a very large number of builders in the country who are perfeetly able to deal with their businesses in every way, and who are also equally master of their financial position. An abundant number of snch men are to be found in all of our large towns, and in our smaller towns they are spriukled about here and there; but these men stand forward as being very distinct examples from the great bulk of the rest. They are usually men who have put into their business such an amount of unremitting toil and ability as would be almost certain to make the success of anything they took iu hand. They are not the representatives of a class; they are selected examples of snccess, such as are to be found in any and every sphere of life. It is the position of the ordinary contracting builder which is to be considered.

The first thiug to be said about this class is that it is a very easy thing to commence in business with a capital say of £50. With £100 or £200 he can make quite a show, but my experience is that very few start in business with anything like so large a capital as is represented by the larger of these sums, unless they succeed to a business. I should say that the generality of builders commence practically without any capital, and that they do so as a rule to carry out some work for a relation or a friend, who is prepared to assist them a good deal with ready cash, without which they might not be able to pay the first few weeks' wages.

The obtainance of timber is not difficult, inasmnch as, being likely to be more or less known in the town at which they establish themselves, they can obtain the wood they require from a local dealer, under the promise to pay for it "out of the first draw." If they do possess some capital it is easy enongh for them to journey to the nearest port, and by paying cash for the first lot establish themselves in credit at once.

Having hired a workshop and timber-yard, and having got in some stock, and put up a signboard, callers, sooner or later, drop in, and by and by the difficulty only is to keep out of buying. There is uo necessity to eularge upon this circumstance. Credit is easy enough to secnre. Having fairly established themselves, and the first contract approaching completion, the new starters seek for fresh work, and then they enter into one or two more contracts, as the case may be. The ready opportunities afforded by the easy terms of credit create fictitious capital and unwise confidence, and if the building trade is in a busy state the new firm will quickly have grown wonderfully large.

Bnt what about the profits that are being made? A very great nnmber of unedncated and uuqualified men enter into the building trade, and such men are not the men to trouble themselves with very nice calculations. Many of them may be good practical working meu, but a good deal more than this is required to make up the elements of success.

Let us turn aside from the building trade for a moment, and consider whether the attainment of profit is an easy task in any trade. That it is an easy task in any trade will, I think, be strenuously denied by those who are making the effort.

It is a very difficult task to make profit in the building trade, aud for this reason : the builder who successfully competes for a contract has usually given iu the lowest estimate in competition with several others. But, even if estimates did not vary a great deal, what rate of profit would any merchant expect to get who had to compete in writing with several others for every order he took? A very small rate, I fear. Yet this is precisely the sort of competitiou that a builder has to endure.

Nor are the difficulties of estimating to be entirely embraced by the fact of a severely existent competition. There exists the further fact that, although a builder may conscientiously rnn out each separate item on his bill of quantities, a thiug which he should bnt does uot always do, his profit is, after all, very much at the mercy of a large number of unreckonable circumstances. It should be borne in mind that the greater part of his work is carried on under the strictures of a very one-sided but apparently perfectly legal document which he is nearly always required to sign. This document contains a number of clauses which are eminently unfair, and which it is really not intended should be enforced, but which are kept at hand, often enough for the purpose of being able to tyrannonsly enforce the execution of an unfair desire. What is to be said of the fairness of such a clanse as that which requires that "all the wood shall be of the best quality, and free from coarse and loose knots, sap, shakes, and all other defects?" Yet this is an every-day clause, aud one the fulfillment of which a builder, taking a contract, would certainly be reqnired to sign his adherence to.

It is not to be wondered at that the liquidation lists contain the names of builders out of all proportion to those of every other business. The profits of a builder cannot, under these conditions, be otherwise than very small, and most assnredly the risks he incnrs are exceedingly great.

So much, then, for the position of the contracting builder.

Now let us briefly discuss the surronndings of the other man—the speculative builder. It is, perhaps rather difficult to decide upon an exact specimen, because speculative building is nearly always carried on under conditions peculiar to the town or place at which the work is being conducted. It is my special desire to comment upon the position of the speculative builder, who is reliant upon some local building society furnishing him with money. When such a builder decides upon putting up some property his first step is to secnre a piece of building land. He prefers to buy this land "in chief," because this is the easiest plan for him on financial grounds. He pays rather more for his land on this account; but he does that all round, for the same financial reasou.

It is rather tight work for him during the early progression of the works, because he finds it difficult to pay wages, in the absence of advances from the building society into which he has entered himself. However he gets his first advance somehow very early on, and he manages to keep going. These early advances cost money—backsheesh money—but he has made up his mind to this. He decides, perhaps, to economize this cost by clippings saved from the quality and quantity of the materials he will introduce into his buildings. When the work has got fairly started its conduction is a matter of comparative easiuess. Advances of money come in from the building society, and the payments required to be made for the materials employed can be deferred.

The sole objects of the speculative builder—I am re-ferring, perhaps, to a bad but unfortuuately numerous sample—now are to hurry on the work as rapidly as possible, to build as cheaply as possible, regardless of all inferiority, and to borrow as much money as he can from the building society. He hopes, in fact, to make his profit ont of the surplns represented by the difference betwixt the cost of the completed buildings and the money advanced. He relies upon that surplus for his profit in niue cases out of every ten, because he knows perfectly well that there is little hope of his finding a purchaser for his miserable property.

Certain readers of this paper may feel inclined to discredit these assertions, believing possibly that no building society could afford to be so stupid as to advance upon the property a greater sum than it cost to erect; but the hypothesis is upset by the fact that these societies have done it in hundreds—nay, in thousands, of cases, and with this result: that nearly every one of the building societies to be found in our large towns is hampered with the possession of a lot of untenanted "Jerry" built property, which they would only be too glad to dispose of at a third of the money they have advanced upon it, but a great deal of which would be declined by property buyers if it were offered to them for the half. In the past building societies may have amassed huge profits by bringing into force practices of reckless trustfulness and semi-peculation, but the supposed profits are found to have been of a most visionary character.

It is not a pleasant task, neither is it a peculiarly interesting one, to expend labor in detailing a lot of evidence of the doings of those who have been associated with the putting up of "Jerry" property. Most of the facts are abundantly known. If the builder has committed crimes, the societies have suffered. It is not necessary to express wonder at the former or sympathy with the latter. The question only is, what profit is the builder likely to put together under such conditions of trading as those to which I have made allusion? He is less likely to make his business profitable than is the contracting builder, and he is distinctly more liable to meet with disaster. There is always at his elbow the ready chance that the society from which he is borrowing his money may take panic at his doings and suddenly stop supplies, a stoppage often enough lightly veiled under the promise of further advances to be made when the work has more nearly approached to completion. His liability to disaster is increased by the kinetic forces brought into operation by reason of his impecuniosity. He must keep moving forward. To finish up his present and commence no further speculations is to cause a kind of foreclosure, which he cannot at all bear up against. His existence is to be prolonged only by continuous action, and he is thus hastened into further speculations, which possibly his senses tell him are not calculated to prove profitable.

Roughly enough outlined, these two cases are illustrative of the positions of perhaps two-thirds of the contracting and speculative builders of the country.

If the positions are, as I have had to represent them, unfortunate, I can only regret my inability to suggest a plan likely to lead to an amendment. Palliative measures would, I think, be the most likely to result from restricted credit.

Polytechnic Discussion.

AT a meeting of the Polytechnic Association of the American Institute, New York, the regular subject, "Lime," was opened by Dr. Vanderweyde, who presented the generally accepted theory for the formation of limestone proper: and presence at early periods of a strong solution of lime and an atmosphere strongly filled with carbonic acid, all at a high temperature. The solid particles of carbonate, produced at the surface by the contact and chemical union of these elements, settled and formed at the bottom beds of lime rock proper. Marble was a later formation from the aggregation of the remains of minute shell fish. He explained the principal forms of sulphate, the combinations of sulphuric acid with lime, plaster of Paris; also phosphate of lime, inorganic, apatite, and organic, the beds of bones in South Carolina, being used as fertilizers.

All stone is soluble. The limestones and marbles are quite appreciably so. The marble columns of Girard College have the flutes on the outer side appreciably duller to-day than those on the inner side. The outer side is more exposed to the soluble effects of rain.

He had been at some pains to test the rain water trickling down on the outside of the columns of Girard College. When it was concentrated by boiling to one-fourth its natural volume, the ordinarily sensitive test, oxalate of ammonia, showed distinct traces of lime in the water. That lime had been dissolved from the solid substance of the column. But marble was sufficiently durable for ordinary buildings. It would probably stand in this climate twenty centuries.

Professor Dunn explained the theory of mortar. Roasting in kilns drove out the carbonic acid from the carbonate of lime, whether in the form of limestone, marble, that form of carbonate which is sometimes called alabaster—though the term is more correctly applied to the sulphate alabaster—oyster shells, etc., and made quicklime, oxide of calcium more or less mingled with other matter. The manufacture of mortar simply allowed the quicklime to again resume its form of carbonate, but it would not do it successfully and make strong work except by a liberal distribution of silica.

Cement tended to "set" rapidly. It could be prevented from setting by hoeing it over in a mass, but work made from cement thus retarded was inferior. He cited the case of a gentleman who made a dam with hydraulic cement thus treated. It was good material originally, but the wrong mode of working it made poor masonry. His dam leaked, and failed from no other apparent cause.

Mr. Rudisch explained several forms of lime kilns, including the modern continuous kilns. It made the best slacking to add the water at two stages. The exact relation of the silica and of the carbonic acid which was supplied, to the pure lime, to make a strong stony mass again, had been the subject of much experiment and varied practice on large and small scales. If the sand was mixed with lime before the water was supplied, it made poor mortar. Yet our best cements were made by grinding the lime and silica together before the wetting.

R. d'Heureuse said it was an interesting question what proportion of magnesia made the best lime. It was agreed that a little magnesia made an improvement, but the dolomites of this island and the vicinity made very inferior lime, from the presence of too much magnesia.

Professor Keith explained the nature of the artificial stones used for pavements. Lime was too cheap to bear long transportation. Users often gave too little attention to the quality. The best lime was burned at a moderate heat. The carbonic should be driven from all the forms of carbonate at only a moderate heat. Lime was often injured by the vitrification of a portion of its constituents.

Lime was indispensable to the assayer's art. Beds of phophates were used in a large way in refining metals.

Cabinet Making by Machinery.

BY AN OLD HAND.

IT must be admitted that machinery has been of late years an aid to the cabinet maker.

Working by machinery means the application of machinery to every part of the work, as far as practicable, from the cutting out until the job is ready to put into the cabinet maker's hand, prepared for him to clean off and put together.

There are machines made which embrace the whole of the operations necessary for this planing, squaring up, mortieing, tenoning, dovetailing, molding, shaping, in fact all that is required to be done.

It is not within the province of these chapters to enter into a detailed description of these machines, and it would be invidious to name any particular one, seeing there are so many good makers. The reader can refer for such information to various trade journals and illustrated catalogues which are issued, containing descriptions and prices. From them they will be able to select the machine most adapted to their requirements. There are also opportunities, for those who wish, to see machines at work at any of the works or agencies of the various English and American makers. Where cabinet making by machinery is adopted as a system, each firm generally makes one kind of work a specialty. One firm may devote their attention to drawing-room furniture; another, dining-room; whilst again another, bedroom furniture. This may again be divided; but it is enough to point out that by doing this, quantities of the same article, having the same design, can be run at one time. Where this is the case, each machine would be in charge of one operator, and a great deal of the adaptability of the machine resting with him, there would be greater scope for this; the larger the quantity, as it is of the utmost importance that where machinery is adopted, it should be used to the fullest extent and greatest advantage. The first thing necessary is to have all the wood cut out for the work.

For the guidance of the workman, working drawings are furnished by the draughtsman. These are generally drawn full size, having all the required sections marked on same. Care must be taken that wood suitable for the job is selected, and that it is cut out sufficiently large to allow for working.

This can be done with an ordinary circular saw in the usual way. The saw used for this purpose should be run in a table about nine feet long, and having sufficient width and room for cross-cutting. It should also be fitted with a sliding fence, adjustable with a screw to the various widths required for running out narrow stuff, such as framing, drawer fitting, and the like. After being cut out, the wood should be exposed for some time to the air, so as to ensure its being thoroughly dry. Too much care cannot be taken to avoid the possibility of warping or shrinking in the work when finished. Neglect of this causes trouble, and depreciates the value and appearance of the work when finished.

Before proceeding with the machining, all necessary gluing should be done, all the joints and edges shot at a joining machine, joints made, slippings and facings glued on. The first operation now is to have all the wood planed on one side at the planing machine. This, as every cabinet maker knows, has for its object surfacing the wood, so that it shall be perfectly straight and level, or as it is technically called, "taking it out of winding." This is done by passing the wood over the planing machine, a good idea of which can be formed by comparing it to an inverted plane, the bottom of

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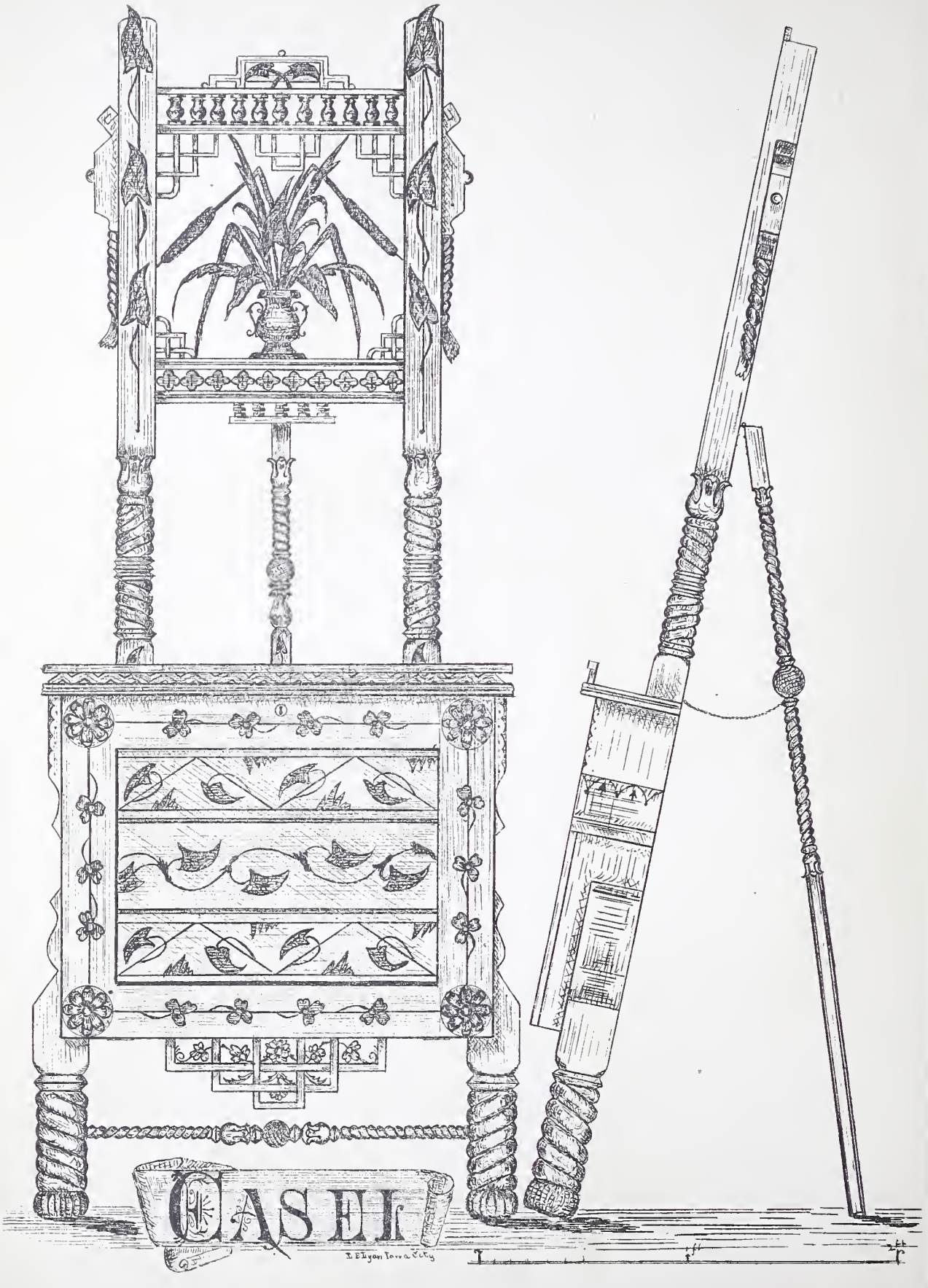

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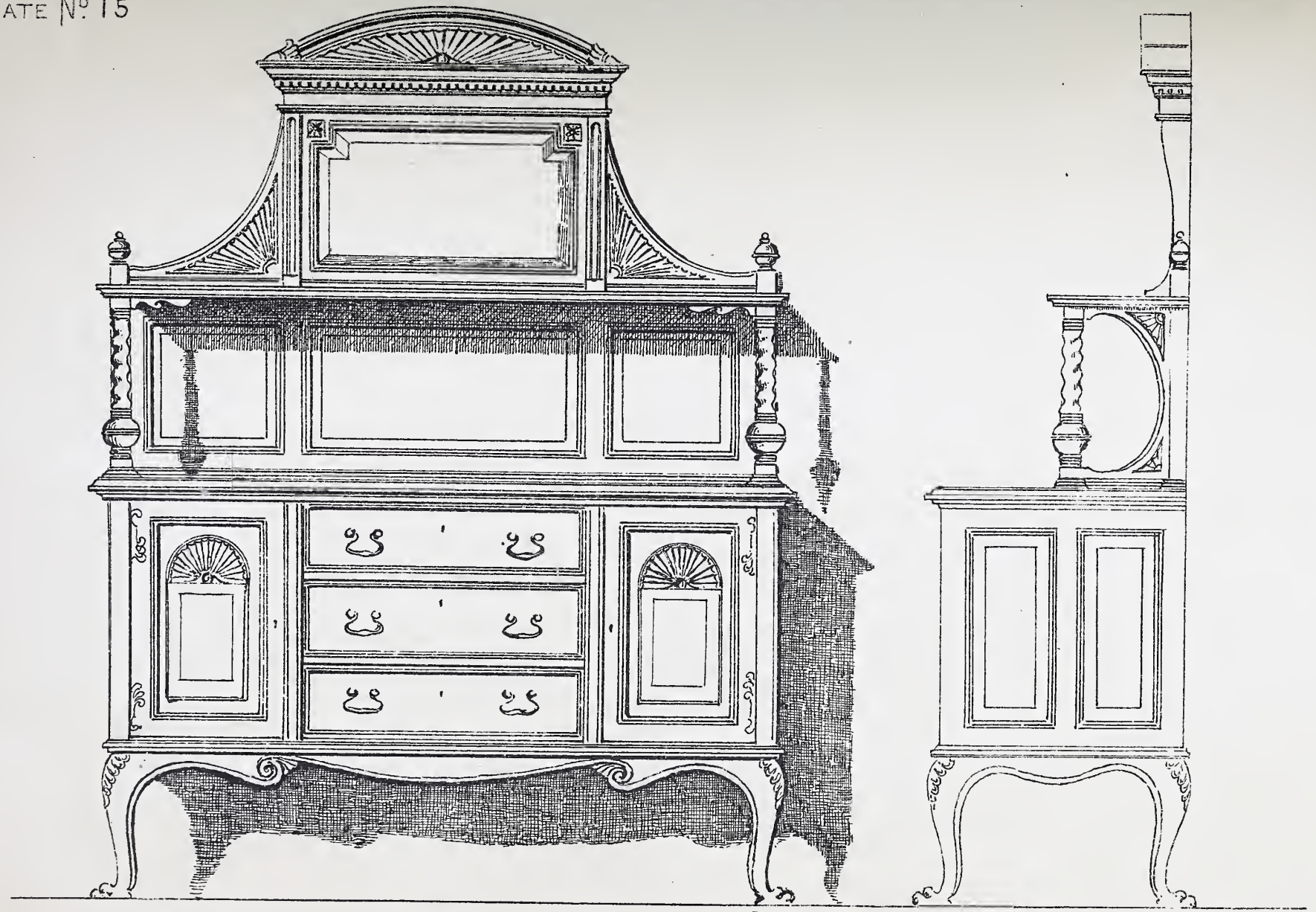


S. N. Small DESIGNER 48 Canal Street. Boston.

the plane answering to the top of the machine. The plane-irons or cutters are fixed on a revolving spindle, which works toward the operator. The wood having been made perfectly true and straight, it has now to be brought to the thickness. This is done in the same machine by lowering the beds below the cutters, the wood being passed through under rollers which keep it in its place ; this ensures perfect evenness and uniformity, which is essential to all good work. The wood is now ready to be brought to the finish sizes in width and length. The face edge being shot perfectly straight and square, the wood can be cut down with a circular saw on a table similar to one already described, fitted with a parallel gauge to the required width. For cutting to a length, a circular saw mounted on a spindle, working in a traveling frame set perfectly square, is generally used, one end being cut square ; the other end can be cut to the length required by means of an adjustable gauge. These remarks apply to wood which is flat and square ; but for all shaped or scroll work a band or gig saw is used. This is a machine which is well known, from the small saw used for fret wood to the largest in use for the heavier cabinet work, such as chair work and the like. Here the shaping or variety machine comes in to our aid, as by its means almost any given line can be shaped with the greatest nicety and exactness.

But "the framing" in the job has to be morticed and tenoned—an operation done by various machines in different ways, but all having the same object. From the working drawing, which is generally drawn full size, the lengths and sizes can be taken, and the work marked out and prepared for the machines. There are also dovetailing machines : these are of varied construction, and although used by some firms, are not so generally adopted as other machines, the difficulty being to cut a dovetail consistent with the principles of strength. Whilst marking off the work, all parts requiring to be turned can be marked off for the turner, and passed over to him. In these operations especially will be seen the advantage of having a number of the same pattern and design, as it saves the constant shifting of the machines, and means a saving of time and labor.

There are also machines for boring and dowelling, which can be done when the work is ready, such as dowelling on columns, boring for spindles, or any work of this kind. There are many minor operations which can well be done by machines adapted for the purpose, such as ploughing, grooving, and rebating, for it must be remembered that, as far as practicable, the work ought to be done by machinery, and the greatest possible advantage reaped therefrom. Up to this point the same results have been obtained as those achieved by ordinary handwork, with a very great saving of time and labor, and having the advantage also that every part is treated alike. The wood has all been "thicknessed," squared, and sized correctly, mortices and tenons right size and depth, so that the work shall fit and be true and substantial when put together, with all the joints well up and close fitting. This is the character of good work, whether wrought by hand or machinery ; and it is evident that it can be obtained to a greater degree by the latter. The class of work now being made admitting the use of solid wood (as for instance American ash, American walnut, wainscot oak, and the like,) is particularly adapted for machine work, not only in the putting together, but also in the molding and ornamentation of the same. This can be done before giving the work to the cabinet maker.

Whatever moldings or ornamentations are required can now be worked. For this purpose there are various classes of machines, not only for running moldings on the straight, but also on any given line or shape by means of the shaping or variety machine already referred to. There are also machines for different kinds of incisings and ornamentations, which can be used with good effect. It is almost superfluous to say that by the judicious application of these the value and appearance of the work is enhanced. This comes properly from the designer, as we have already noticed that on the working drawings as supplied by him are given all the sections and details for these various moldings. For all straight moldings, cutters are used fitted to a revolving spindle, working either vertically or horizontally. These cutters can be made to any required section, so that practically there is no limit to the introduction of moldings as far as working is concerned. Here there is a decided superiority over hand labor and the use of the ordinary molding planes, it being almost impossible to produce by hand many of the moldings worked by machinery. The fineness of the lines, and the exact production of the section required, is what gives effect to work done in this way. Another advantage in the method referred to is, that if moldings are worked in the solid, there is no danger of their being knocked off, as would be the case where the molding is rebated and glued on. The work, after having these moldings worked, is now ready to give out to the cabinet maker. He finds all the preparatory work done for him, and he has only to proceed with the cleaning-up previous to putting the work together.

In such work as careass work, after getting the carcass together, the doors and drawers (where required) would have to be put together and fitted. How this affects the workman need not be discussed here, as this is merely a sketch of "woodworking by machinery," and purports only to give a general idea of the same. By mere description it is difficult to do more than this, as, for each particular kind of work, there must necessarily be that which is adapted to it, the choice of which must rest with those who have the work to do.

Reference has been made to the means of getting what is required from some of the numerous makers of woodworking machines who vie with each other for the distinction of placing before the trade machines suitable for every class of work. The stimulus given to the cabinet trade these last few years is unquestionably the introduction of a better era for all concerned ; and whether it is the manufacturer or the workman, all will participate in the increased benefits. The public, too, will find that what they purchase is both serviceable and ornamental, having at least some distinct lines which will give the work a claim to be called in truth "Art Furniture."—*Cabinet Maker* (Eng.).

Ventilation of Halls of Audience.

AN able and exhaustive paper has lately been presented to the American Society of Civil Engineers, on the ventilation of halls of audience, by Mr. Robert Briggs, C.E. It appears from this paper that a man in health and at rest requires for breathing 480 cubic inches of air per minute. The inhaled air, in American summer condition of 70° Fah. and 70 per cent. of hygrometry, or about 1·7 per cent. of its volume of aqueous vapor, and 0·04 per cent. of carbonic acid, will, when exhaled, be found to contain nearly three times as much vapor and nearly 100 times as much carbonic acid, and to have lost one-fifth of the oxygen inhaled, while the temperature will have risen to 90° Fah. But, contrary to the teachings of some authors, the exhaled air will be about 3 per cent. lighter than it was before being breathed. The carbonic acid does not, as some believe, separate and fall to the ground, but it is inseparably mixed with the breath.

Breathing is not the only means through which inhabited air is vitiated ; insensible perspiration adds one-fifth or more to the carbonic acid sent out with the breath, while an average of about two pounds of water per day evaporates from an adult man at rest and awake, and both add to the contamination of exhaled air.

Now, if it be accepted that air is unfit for breathing after having once been in the lungs, it seems that about one-third of a cubic foot of air per minute is required by each person. The internal temperature of the body being nearly 100° Fah., it is essential that the surface should radiate heat, and that the air thus heated should pass off. Small portions of ammonia and gases, with floating organic matter, dust, and smoke in the air, with the probability that the origin of disease is only found in the germs of living organisms that subsist on the decomposing organic matter suspended in the atmosphere, are important facts in estimating the quantity of air required for perfect ventilation. It seems, therefore, that at least four cubic feet per minute are required, and that this quantity would amply ventilate a single person if it could all be devoted to his use exclusively.

Passing now to the subject of practical ventilation of halls of audience, it appears that each individual of an audience cannot, by known means, be supplied with his quota of four cubic feet per minute, which would, if made to pass upwards along his person while standing, serve to perfectly ventilate him ; it further appears that in a room continuously occupied by persons in health, or at least not affected with offensive diseases, as much as 30 cubic feet of air per minute must be properly introduced for each individual. A desirable capacity for the chamber seems to be 1,000 cubic feet of room for each person, but audience halls average no more than 200 to 300 cubic feet to the person, and therefore contain only about six to ten minutes' supply of air. This smaller capacity does not seem to be a very important defect, provided a systematic supply of air, at a proper temperature, and in a desirable state of humidity, is properly introduced and distributed. The last part of the problem, as here stated, is the important difficulty to be overcome.

The system of air introduction through perforated floorings is in operation, and has been for twenty-four years, at the Houses of Parliament, London, although it is thought to be "embarrassed in its action by singularly unmechanical and insufficient apparatus for warming and supplying the air."

In other systems the standing difficulty is the establishment of local currents which produce unpleasant sensations in those persons who are exposed to them, and the desideratum has been and still is to supply an effective quantity of agreeably tempered air in such a way as to be imperceptible to the audience.

As regards the comparative effects of gas and electric lighting we are told that "the vitiation of air by electric light, arising from the slow combustion of the carbon, is too insignificant to form any element in considering the ventilation." The ventilation of churches that are heated by furnaces in the cellars beneath the audience can be partially done by removal of air at or near the floor, but no large ventilating shaft from the upper part of the room is admissible as a means of natural ventilation.

Natural processes can be only partially successful in ventilating audience rooms. Success "can only follow the complete adaptation of mechanical appliances and apparatus, as well as of structural arrangements, to the ascertained wants and requirements of the individual composing an audience."

Fans of the disk pattern are recommended as being from 10 to 15 per cent. more effective than the common incased fan. The speed of the fan should be such as to impel the air in the ducts at the rate of 600 feet per minute, while the ends of the ducts should be fitted with baffling boxes so that the air may leave the box at a velocity not exceeding 120 feet per minute at a distance of one foot above it.

Box coils, as they are called, consisting of horizontal pipes inclosed in a chamber, are best for indirect heating (ventilation); while vertical coils, though less efficient by 20 per cent. are preferable for office heating.

The efficiency of well exposed steam pipes with steam at 36 to 40 pounds pressure is given as three cubic feet of air heated from zero to 100° Fah. per square foot of surface, or five cubic feet from 50° to 70° or 80°.

For direct heating by coils placed in the rooms to be heated one square foot for each 80 cubic feet of space within the walls of an exposed room, but special provision must be made for doorways and open passages.

The cross section of steam supply pipes should have one circular inch area for every 500 feet of effective heating surface, enlarged $\frac{1}{400}$ for each foot from the point of first distribution or branch from the main. The condensed water or return requires one half as much. Flow mains should rise vertically to some point where they can be drained or trapped, and then descend half an inch in 10 feet to the end.

Boilers of the common tubular form require one square foot of heating surface to each 9 square feet of coil surface or radiators, or one square foot of grate surface to 270 of radiating surface, the grate and heating surface of the boiler being as 1 to 30.

Chimney flues 50 feet high should have an area one-tenth of the grate surface, and 100 feet high, one-twelfth. The maximum quantity of coal consumed will not exceed 8 pounds per square foot per hour, while for six months in the year 20 to 30 pounds per 24 hours per square foot will suffice.

A fan delivering 20,000 to 40,000 cubic feet of air per minute will require from 20 to 60 pounds of coal per hour. No allowance need be made for steam to drive the fan where buildings are warmed and ventilated, as the exhaust steam will be utilized for heating purposes.

The author says, "steam heating apparatus in all its details, as used in America, is peculiarly American," and "as practiced here, is not fully known or used in England or France, and but little more known in Germany."—*Scientific American.*

AT a recent meeting of the Engineer's Club, of Philadelphia, the secretary read a detailed description of the moving of the Hotel Pelham, corner of Tremont and Boylston streets, Boston, for the purpose of widening Tremont street. The hotel is built of freestone and brick, 96 and 69 ft. frontage. The Boylston street wall is supported on 8 granite columns 12 ft. high, 3 and 4 ft. square. There is a basement and 7 stories above the sidewalk. Height above tramways upon which it was moved, 96 ft. Weight, 5,000 tons, exclusive of furniture, which was not disturbed during removal, as also were not the occupants of the stores on first floor and some of the rooms. The general arrangements for moving consisted of heavy and substantial stone and brick foundations for iron rails and rollers, and the building was forced to its new position by 56 screws, two inches diameter, half-inch pitch, operated by hand against timbers, arranged to uniformly distribute the pressure against the building.

Much care and ingenuity was displayed in the details of the arrangements and work. Two months and 20 days were occupied in preparation, but the actual time of moving was but 13 hours and 40 minutes; the greatest speed was 2 inches in 4 minutes. The hotel moved about one-eighth of an inch at each quarter turn of the screws. The whole distance moved was 13 ft. 10 in.

Four thousand three hundred and fifty-one days' labor was required for the work. The whole cost was $30,000. This is the largest building that has ever been removed, although larger have been raised, which latter is a much simpler and less risky operation. The complete success of this undertaking is shown by the fact that cracks which existed in the walls prior to removal were not changed by the operation. Paper was pasted over them before commencing, so that if any change occurred it might be seen.

Is it Advisable for a Builder to Manufacture His Own Joinery?

THE question as to whether it is more economical for a builder to buy ready-made joinery, or to manufacture it himself, is very important, and is one on which great diversity of opinion exists: so that we do not feel sanguine of being able to decide in such a manner as to attach to our opinion the whole, or even any very great majority, of those who may care to discuss the views advanced in this article.

The question indeed is, after all, one of opinion rather than of clearly definable fact, and yet more so is it one which is regulated by circumstances. That the question—or at least the economical part of the question—is one more of opinion than of fact is assured by the reason that no builder can accurately know what his joinery work does cost him when he manufactures it himself. He may indeed be able to make a pretty shrewd guess at the cost; but, after all, his calculation is nothing more than a guess. We will occupy little space by pointing out our reasons for urging this.

A builder buys a parcel of deals, which he intends to use for the making of joinery-work, and when he has them piled in an open manner (so that the wind can season them) for some time, he selects out a number, and has them sawn into boards and reared on his "perches" to dry. Here, as a rule, we have two elements of cost entirely lost sight of; first, the cost incurred by the lapse of time whilst the process of seasoning was being conducted; secondly, the increased value of the selected deals, which follows by reason of the incurrence of loss arising through the rejected deals being eventually employed for purposes for which an inferior and less valuable brand would do equally as well.

The deals, now boards, being "perched," a precisely similar cost is added to the joinery work constructed from them, when the seasoning and selecting processes have been repeated. Considerable labor will now have been spent upon the wood—we do not refer to the labor of sawing, because this work may have been, as it mostly is, done at a public saw-mill, and therefore the cost is to be reckoned (although we strongly suspect that in counting the cost of an article of joinery work the cost rarely is accurately reckoned)—but the labor of piling, selecting, removing, and repiling will have necessitated some expenditure. It may have been 2½ or 5 per cent. upon the first cost of the wood; it is more likely to have been 7½ or even 10 per cent.; however, as in no two instances is it likely to have been precisely the same, it can only be guessed at roundly.

When, however, the labor charges of the joiner for making the required articles have to be formed into an item of the cost of the production, the estimator, in the generality of cases, is in a very hopeless position. It may be argued that the workman would willingly engage himself on piecework; but as against this must be placed the fact that not only has the builder no time to spend over making a number of special contracts with his workmen, but there is also to be considered that a builder is constantly requiring his men to leave off their work, and undertake some other task of immediate necessity. It also happens that it is an exceedingly rare circumstance for builders to engage their joiners on piecework terms. Thus, as a matter of fact, the cost of the labor of constructing joinery work is not reckoned out. It is guessed at sometimes, and at other times, and very often, it is "lumped."

This being the case, the data for argument as to the comparative cost of homemade and bought joinery work are destroyed, or rather are not fully furnished, and so the difficulty of comparison in this respect is very materially enhanced.

One more item of cost may, however, be noted, and that is that the joiner takes ready money every week for his labor in the shape of wages, and does not allow any discount to be deducted therefrom. Of course, it is not expected that he should; but the point of cost is worth noting, as we are of opinion that in reckoning the cost of construction it is one of those small items of cost which are very frequently lost sight of; and other items of cost present themselves as we write, of which are the charges always necessitated by the finding of room, light, warmth, etc., so as to enable the workman to labor, and although taxation is trifling it is something.

Many of these items appear at first to be merely trivial; but collectively they represent no inconsiderable portion of the cost of the finished article.

But we have sufficiently argued upon the impossibility of arriving at the exact cost of the homemade production. Possibly, the manufacturer, who makes and sells joinery work wholesale, cannot—although he is continually occupying himself with estimating the cost of production—accurately arrive at the cost. That he can gauge it much more accurately than the builder will, of course, be admitted.

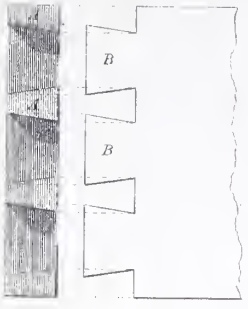
We have then to inquire what are the probabilities, or rather what are the certainties, which assure us that the wholesale maker can produce a joinery article at a less cost than the builder? No doubt the most powerful help to the production of cheap joinery work is an abundance of machinery immediately applicable to the various required purposes. For instance, there is the steam mortising machine, which, in the hands of a boy trained to its constant working, gets through an immense amount of work; and there is the tenoning machine, the cross-cut circular saw, the trying-up machine, and the heavy planing-machine, most or all of which may be found in the workshops of the larger joiners, but most or the greater part of which are not to be found in the workshops of the

JOINTS IN JOINERY.

DOVETAIL JOINTS.

PLATE No. 16

Fig. 1. No. 1.



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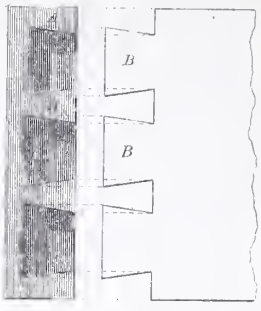

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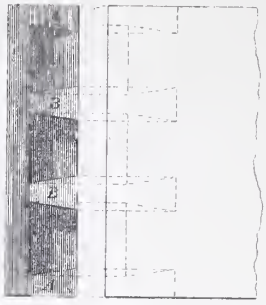

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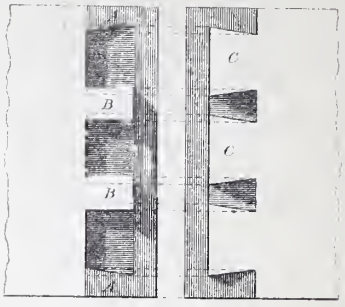

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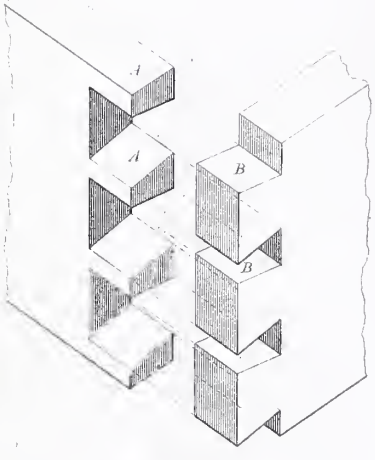
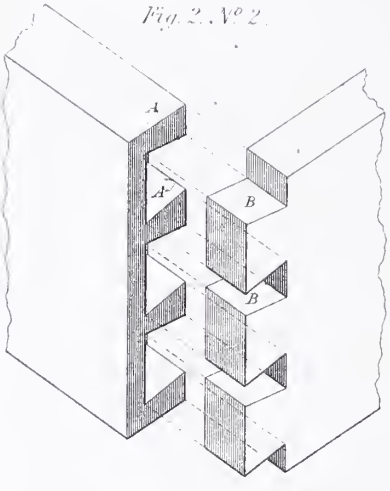


Fig. 2. No. 2.



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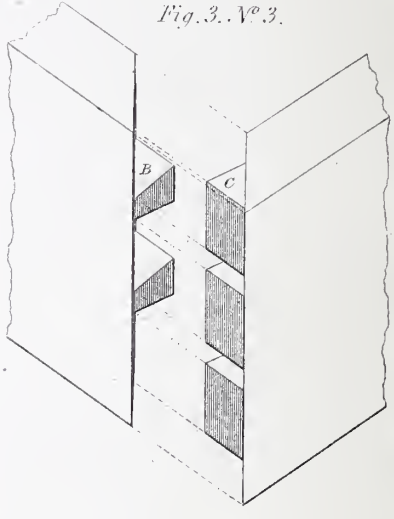

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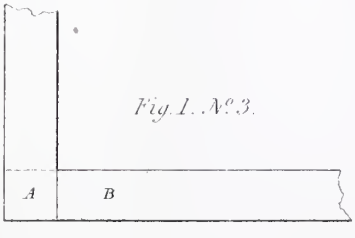
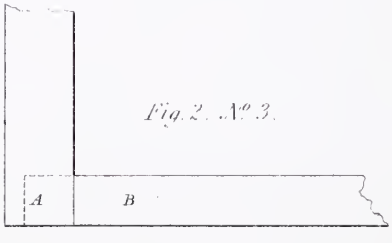


Fig. 2. No. 3.



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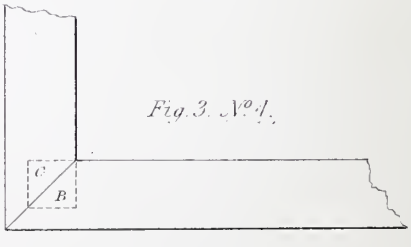

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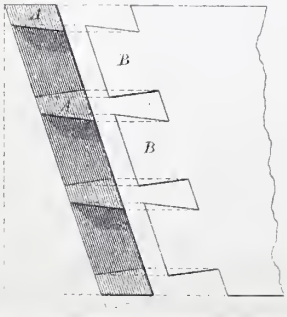

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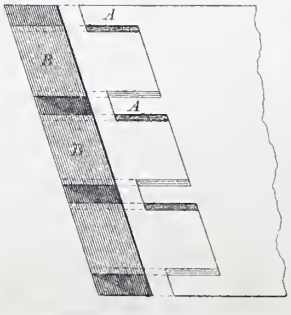

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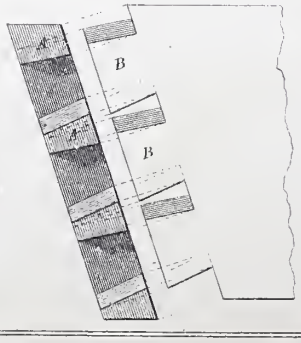

Fig. 5. No. 2.

smaller, or even moderate-sized builders. When the machines are possessed by the large builders, they are rarely kept in full work, and when worked they are usually worked by men. At the large joinery establishments boys can be trained to the service of particular machines, in the use of which by constant and undivided practice they become remarkably expert.

Large joinery factories are, or at any rate they certainly should be, established at one of the ports.

When this event is secured, two advantages arising therefrom become apparent. The first of these is that the considerable expense of carrying into the country a quantity of waste wood is avoided, insomuch that one-sixth, or possibly, all things considered, one-fourth, of the cost of carriage of the wood is saved. On this head, however, some portion of the advantage gained is lost to the consumer by reason of the extra rate charged by the railway companies for carrying joinery. At the ports there are always special parcels of stock, say middle quality stuff, which possess peculiar fitness for the making of joinery work, and these parcels the watchful and intelligent manufacturer, being on the spot, secures. As a rule, too, the wholesale maker can take larger quantities of stock than can a builder, and some cost is saved in this respect.

One thing is quite certain, and that is that he can devote his undivided attention to the economical production of the work, and this is what a builder cannot do. He has to relegate the duty to a sort of half-foreman.

Economy in the production of a manufactured article, if secured, is secured by the weight of a number of collective savings, the possibility of securing which rests entirely, in the case of joinery work, with those establishments which are conducted upon an extensive scale, and which are situated at the ports.

The question of the comparative quality of the joinery work made by builders, and that turned out of the large joinery factories need not be discussed, because the factories turn out precisely the quality which is desired by the buyer, and this quality is no doubt in all cases regulated by the price paid for it.

Our argument is that at these large works the joinery articles can be produced at a cheaper rate than they can be manufactured at by the average builder, and our further contention is that, inasmuch as the multifarious duties of a builder's business sufficiently occupy his attention in other branches of his calling, he will do well, for economical as well as for other reasons, to delegate the making of the greater part of his joinery work into the hands of those who, having an abundance of machinery at their disposal, and who, being able to devote their entire energies to its economical production, are in every respect the best fitted and most likely to produce it at the cheapest possible rate.—*The Timber Trades Journal.*

New Publications.

WE deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

Architecture for General Students.—By Caroline W. Horton. Houghton, Mifflin & Co., publishers, Boston, Mass. Price $2.00.

Students of architecture will find this work a very useful aid and a companion book to Rosengarten's "Hand Book of Architectural Styles." The book before us is an intelligent and interesting compendium of information regarding architecture, and briefly sets forth the leading features of the various orders and styles in current chronological order, and makes just sufficient historical mention to make the work interesting to the general historical student. It must not be supposed, however, that the book is only historical; it is descriptive, instructive and full of practical suggestions. These features make the book valuable to the practical man as well as to the general student; and no architect or builder's library will be complete without it. The illustrations, several of which are full-paged, have been chosen with a true sense of their adaptation to the subject in hand. The closing chapter, which is on "Architecture in America," is replete with good sense and happy suggestions, and if followed will tend largely to correct many false principles in building that now obtain. We submit the following paragraph as a specimen:

"Now some of the cathedrals of Europe have been in progress for six centuries, and why may we not be content to let as many decades pass, or at least have as many, before the church edifice stands completed? Would it not be better that we build broad foundations and solid walls so far as our means allow, finishing only enough to render the edifice comfortable, and leaving the ornamentation to the next generation? Would not this be a better inheritance than the complete but poorly built church, with its wooden ornaments already beginning to decay, and are we not too often teaching a love of tinsel and false show even in the sanctuary?"

Draftsman's Manual, or "How Can I Learn Architecture?"—Hints to Engravers. Directions in Draftsmanship. New Revised and Enlarged Edition. By F. T. Camp, Architect. W. T. Comstock, Publisher, 174 Broadway, N. Y. Price, cloth, 50.

The rapid sale of the former edition of this work has induced the author to issue the present edition, which, in a few instances, is something better than the former one, he having added as appendices several valuable chapters, one being devoted to remarks regarding a "Draftman's Outfit," and another on the "Proportion of Rooms." These interested who have not a copy of the previous edition, should hasten to secure one of the present issue.

Mechanic's Liens: How Acquired and Enforced.—A treatise referring to and citing the latest statutes and decisions, and designed for general circulation among Lawers, Builders, Mechanics and Owners. To which is added an Appendix of Forms. By James T. Hoyt of the New York Bar. Price $2.25.

This fills a want that nearly every builder, owner or mechanic has felt some time or other in his experience. It is quite necessary, in these sharp times, that every builder should know his exact position with regard to the "lien law" when employing mechanics or arranging with owners. Equally necessary is it also that the owner should be thoroughly posted with regard to the law; indeed, he cannot do himself justice unless he understands his bearings thoroughly on the subject. To the operative mechanic this treatise will prove a boon of no mean magnitude, if he will only post himself intelligently on its contents, for no one suffers so much for lack of knowledge on this subject as he; therefore, it becomes his duty to avail himself of every opportunity to acquire a thorough knowledge of the law, so that he may protect himself from speculative knaves.

The Standard Moulding Book.—A Catalogue of Mouldings, Brackets, Doors, Windows, Frames, etc., of Standard and Special Sizes and Designs. The Northwestern Lumberman, 154 Lake street, Chicago. Price 50 cents.

This book contains all the regular designs of mouldings, architraves, etc., manufactured by leading makers in the West. The diagrams are full size and made to the *exact measurement*, and can be used as patterns by which to set the cutters. Each class of mouldings may be found in a group by itself, instead of all of them badly mixed together in a state of confusion, as has hitherto been the case in similar books. It contains a number of new and greatly improved designs not to be found elsewhere. In doors, windows and frames it has the very latest styles of inside and outside finish, and a greater variety than has ever before been given.

The Carpenters' and Joiners' Hand Book, containing a complete treatise on framing hip and valley roofs, together with much valuable instruction for all mechanics and amateurs, useful rules, tables, etc., never before published. Revised edition with additions. By H. W. Holly. John Wiley & Sons, publishers, 15 Astor place, N. Y. Price 75 cents.

This little book has long been a favorite with workmen, and it is only necessary for us to say that the revised edition is an improvement on the original work, to satisfy those who know the book that it is well worth the price.

MESSRS. J. B. LIPPINCOTT & Co. have appended to their great "Pronouncing Dictionary of Biography and Mythology" a necrological table of some two thousand names of persons noticed in the work who have died since its publication, or the dates of whose deaths have been recently ascertained. A Table of Contents, also now first placed in the work, reveals among other things a fact that not unlikely has hitherto escaped the notice of readers, viz., that following the dictionary proper of 2,300 pages is a Vocabulary of Christian Names, embracing the leading English Christian names, with their equivalents in the various European languages, the pronounciation of all being indicated according to the principles of the language in which they are written. A Table of Disputed or Doubtful Pronunciations also presents features of interests for scholars.

THE publishers of the "Engineering and Mining Journal" issued January 4, 1882, and will continue to do so each Wednesday thereafter, "Coal," a weekly journal, to be devoted exclusively to the interests of the coal trade, including: 1. The mining and preparation of coal for market; 2. Its transportation; 3. The marketing of coal; 4. The economical use of coal. "Coal" will be profusely illustrated, and the freight, labor and wages questions will be treated in a thorough and popular manner. The statistical information of "Coal" will be collected with great labor and care, and will give the current production of coal throughout the country. "Coal" will be conducted by gentlemen of ability and great experience in every department of the coal trade, and will have, at the outset, a large staff of reliable correspondents at the different coal centers of the country. Subscription price, $2 per year. Specimen copies on application. Address The Scientific Publishing Company, 27 Park place, New York P. O. Box 1833.

VAN NOSTRAND's for January is at hand and contains Recent Improvements in the Compass with Correctors for Iron Ships; The United States Signal Service; The Present Condition of Architecture; The Physiological Effects of Compressed Air; Sanitation in Ancient Rome; Compressed Air, Steam or Electricity for Tramways; Economy of Electric Lighting; The Probable Duration of Iron Structures; Reports of Engineering Societies; Engineering Notes, and a long list of book notices make up a number of sterling worth which will find a large number of intelligent readers. D. Van Nostrand, 23 Murray street, New York.

THE CHRISTIAN UNION for January 5th appears with a new and artistic heading, and the substitution of roman for italic titles and head-lines throughout the paper. The same number contains the article on the Utah problem, by the late Dr. Bacon, which was found unfinished on his desk the morning after his death. It treats the subject with the writer's accustomed force and with the pathos that attaches to anything that conveys one's last thoughts.

WE have received the new volume of the "Furniture Trade Journal," published at 51 Chambers street, New York. If the present number is any indication of those to follow, the first volume for 1882 will surpass any of its predecessors in usefulness and general excellence, and cannot fail of doing good service to the furniture trade. We wish our vigorous *cotem* the success his efforts, intelligence, and good intentions deserve.

The Young Scientist, a Practical Journal of Home Arts.—Published monthly by the Industrial Publication Co., 14 Dey street, New York. Price per year, 50 cents.

This excellent journal for young people—boys or girls—of a scientific or mechanical turn of mind, is the best paper of the kind published in this or any other country, and the numbers (1 and 2), already published for 1882, give evidence that the present volume will excel all previous ones in interesting and useful matter suitable for the young minds for which it is intended. A periodical like this, which is so cheap, so useful, so thorough and reliable, yet plain and easily understood, it seems to us, should be on the table of every house where there are boys who want to know how to make hand-sleighs, wagons, boats, scroll-work and things generally, and where girls live who are fond of raising house plants, caring for pets, or making fancy ornaments for home decoration or other purposes. We believe it to be the duty of parents and guardians of children to provide their young charges with something better than the dime or half-dime literature that is so abundant just now—something that will teach the young mind *facts*, facts, too, that will be of service to them in their life battle with circumstances, and which will in after life enable them to achieve many things in a scientific and mechanical way not now thought of. The "Young Scientist" aims at this—aims to pave the way for greater things, and we know of no person more competent to guide the journal to this accomplishment than its genial editor, Professor John Phin. Readers of the BUILDER AND WOOD-WORKER, who have children, send six cents (in postage stamps) to the publisher for a sample copy, and we think you will not regret the trouble.

Wood Carving.—By Chas. G. Leland. Art Interchange Publishing Co., 140 Nassau street, New York. Price 30 cents, or if paid in postage stamps 35 cents.

This is No. 3 of the excellent Art Work Manuals the Art Interchange Publishing Co. are issuing, and in our opinion is the most useful one put out. The instruc-

tions in it are terse, plain and to the point, and such as any one—male or female—possessing ordinary intelligence, may readily understand. The number is largely illustrated with examples of carved work, and simple designs for the beginner to try his or her hand on.

We can heartily recommend this little manual to our amateur friends as being the best thing of the kind on the subject suitable to their wants that we know of, and we, therefore, do not hesitate to advise such of them as would like to practice the art of carving to secure a copy as early as possible.

The following paragraphs will give the reader an idea of the manner in which the subject is treated:

"If you have never carved at all, take a piece of common white pine wood, and with a ruler draw lines on it from one to end, *with the grain*. Then drive two or three nails into the table, for the end of the wood to rest against, or to steady it. Now observe closely this advice. Get it by heart and keep it in mind. If you follow it, you can learn to carve very soon.

"I. Hold the handle of the tool in your right hand, keep the wrist on the wood, and guide the tool with the fore-finger, or with the fore and middle finger of the left hand. Be very careful indeed that neither the left hand, nor any portion of it, gets before the point of the tool, for should the latter slip you might cut your fingers cruelly.

"II. Remember, from the very first, cut to bear on lightly, to remove just as little wood as possible, and to keep a perfect command of the tool.—(From "The Minor Arts,' by C. G. Leland, p. 77.)

"Now, remembering this, take your piece of wood, and bearing on gently with a small gouge, one-eighth of an inch in diameter, cut grooves along the lines which you have drawn. Try to make these grooves very light indeed. You will thus remove a shaving curled around like a serpent. Try to cut shavings as even in thickness as possible; that is to say, make a uniform, straight groove. This will do for a first lesson. At the end of it you will feel familiar with the gouge. You will know how to hold it and how to guide it."

Full descriptions, with prices and uses of each tool, are given, and the styles and shapes of tools are shown by appropriate illustrations.

We shall be pleased to send the "Manual" to any address on receipt of price; or the money may be sent direct to the publishers, 140 Nassau street, N. Y.

Chats with Correspondents.

A. V. S., Newark, N. J.—We cannot make invidious comparisons regarding the various saws. Each make of saws has its peculiarities. Some are noted for fine finish, some for the way they are "hung," others for peculiarities of material and grinding. Then again, each workman has his favorite maker; one person won't use any saw but a "Disston," another can't think of doing good work if he has not a "Harvey W. Peace" saw to operate with, while a third "knows" there are no saws to be compared with "Richardson" manufacture; while still another would turn up his nose at any saw that was not a "Boynton," and still another can't understand how any person can do good work without saws made in England. No doubt there are instances where saws, made by each one of the manufacturers named, do not come up to the "standard" the firm claim for them, but as a rule you may rely on getting good tools from them if you pay a reasonable price. We do not know of the book you mention, *i. e.*, "Wells' Practical Instruction in Architecture; it certainly is not an American publication. We cannot find it in any English catalogue we possess. "Riddell's New Elements of Handwriting" is the book you require.

"CRIPPLE" writes us to say that the problem for obtaining the cuts on the "planseer and rake," as elucidated on page 28 of the "Steel Square and its uses," is not correct in all cases; "it may do," he writes, "for ¼ pitch, but it will not do for any other." "My plan," he continues, "is to cut on the same principle as I do for the sides of hopper." We should feel thankful to "Cripple" if he would point out the errors in the method shown, as it is our duty to make corrections in cases of this kind whenever we can. Please let our readers have your method of working this problem.

R. N. Cincinnati, O.—You are right, the cost of keeping a poorly constructed house in good repair for five years, added to the extra cost of insurance, runs up in that time to a sum very much larger, when added to the cost of the building then the structure would have cost at first if it had been furnished as it ought to have been. So far as insurance is concerned, one can readily understand why one class of buildings cost more to insure than the other. The difference may be illustrated by a glance at the official report of the Paris Fire Department for 1877, and the annual report of the same year, issued by the Insurance Patrol of Philadelphia. Paris has a population of 1,851,792, and Philadelphia under 700,000. In Paris there were 2,192 fires during the year, 113 of which are ascribed to faulty construction. The total losses amounted to $492,116. In Philadelphia the losses amounted to $718,125.19, although it was a favorable year, and the losses by fire less than they had been for the last eight years, and the authorities reported only 649 fires.

In the capital of the French republic three times as many fires were reported as in the city of Brotherly Love, and yet the French insurance companies did not have to pay so much by $225,000 as their more unfortunate brethren on this side of the Atlantic. Verily, they manage these things better in France.

H. S. B., New York, says the "clipping" we published last month in reply to S. R. anent veneering, was incorrect. It reads that; "The art of veneering originated about fifty years ago, and was most probably practiced in England." "Allow me to say," writes H. S. B., "that the art of veneering has been practised from time immemorial. It was known 3,000 years ago at all events. As for later work, I can show you veneered furniture and panels, that I know to be at least 300 years old if family records do not lie."

J. R. P., Buffalo, N. Y.—You say you cannot understand the full meaning of the word *convection* as applied to ventilation, from the definition given in "Webster's Unabridged." Perhaps the following may aid you in mastering the term. There are two quite different ways by which a fire warms a room, *convection* and *radiation*. Suppose we have a closed iron stove standing out in a room, we feel a certain amount of warmth coming from it in all directions as we approach it, but if we hold a thermometer at a given distance, say 3 ft. from either side, and at the same distance above the top of the stove, we shall find the temperature highest above the stove, and if we pursue our inquiry still further we shall learn that a column of heated air is continually rising from the stove towards the ceiling and then outspreading. The heat that is thrown out on all sides equally is *radiated* heat, that of the uprising air is heat obtained by the *contact* of films of air actually touching the stove, then expanding, rising and *conveying* the heat they have acquired, hence the term "*convection*."

W. H. R., Corydon, Iowa.—We know of no better book to aid you in estimating all kinds of buildings than "Vogde's Price Book, price $1.50. "Brown's Building Table and Estimate Book," is an excellent work where only estimates on wooden buildings are required, but it is not adapted for brick, stone or concrete buildings. Price $1.50.

I. D., Little Fall, Minn.—"Cameron's Plasterers Manual" will give you all the information you ask for concerning plastering and whitewashing. Water-lime is lime that will "set" or grow hard under water; it is known more generally as "Hydraulic Cement."

H. M., Cincinnati, O.—Thanks for your good opinion of the BUILDER AND WOOD-WORKER. We shall strive to continue to merit your good opinion.

T. J. S., St. Paul, Minn.—Hemlock, when sound, is better for many purposes than pine. It is not so liable to warp or shrink as either pine, spruce, or hass-wood. For kitchen furniture it has no superior, being strong, solid, and withal, light. It has no equal as roofboards or rough sheeting, as it holds nails with as much tenacity as sycamore or oak. It will resist fire much longer than pine or spruce, makes excellent joints, studding and rafters. For flour bins, granaries, barn floors, and mill stores, no other wood is nearly so good, as neither rats or mice are able to gnaw holes through it. It is perfectly sweet, and flour, meats, confections or vegetables kept in cases made of it, never have that *woody* taste that is always observable on some kinds of food after being closed in some wooden cases. It has a beautiful grain, and is susceptible of receiving a very fine polish, and these qualities render it a fine wood for wainscoating, stationary furniture and door dressings. It has some drawbacks. Owing to its dense foliage, it is often acted on by the wind to such an extent that it becomes shaky or full of wind cracks. It is hard and brittle in the grain, and consequently full of splinters, making it difficult for workmen to handle without gloves or some protection to the hands. It is also hard to work, requiring tools in the best of order to make respectable work in joining or cabinet work. The knots are the hardest of wood, and few tools can pass through the ordeal of working over a "hemlock-knot" without more or less injury. Its good qualities are many, its bad ones few, and easily avoided. With regard to pearwood for turning, we cannot do better than give you the following:

"Gerard says the timber of the wild pear is very firm and solid, and good to be cut into moulds. The plates for his "Herbal" were cut out of this wood, as were, says he, breastplates for English gentlewomen. In the present day it is much used by turners and pattern-makers; the blocks with which the designs for floorcloths are printed are made from pearwood. When dyed black it can scarcely be distinguished from ebony. Handles for carpenters' tools, measuring rules, &c., are made from this wood. The wood of the pear makes excellent fuel giving out an intense heat with a bright flame."

We are pleased to know that this department is becoming popular among our readers. We shall be glad to see it extend so that one or two full pages will be necessary to meet the wants of those who take part in it.

Owing to extra pressure on our columns this month, we are obliged to hold over several letters, among which we may mention one from J. B. Aze, one from B. J. Z., on the "Slide Rule," and one from S. T.

Publisher's Notes.

SPECIAL NOTICES.

☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

FOR clubbing rates, see November number, page X.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881 can now be obtained from this office. Price, $2.50.

ANY one having a complete set of "Knight's Mechanical Dictionary" for sale, cheap, may find a purchaser at this office.

IRON can be rolled so thin that 10,000 sheets would only equal one inch in thickness or about 80 sheets to make the thickness of one of Esterbrook's bank pens.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881 are ready for delivery. Price, when sent by mail, prepaid, $2.50. When sold at the office, $2.25. This volume contains 96 full page plates of designs.

OWING to a large increase of business, Goodell & Waters, of Philadelphia, manufacturers of wood-working machinery, have been obliged to enlarge their workshops very considerably.

TWENTY-FIVE cents, in money or stamps, sent to this office, will insure you a full-sized drawing and details of an "umbrella stand," and a half-sized drawing, with all details, of a cheap "Queen Anna" washstand, sent postpaid.

WE wish it distinctly understood that we do not send books, papers, instruments, or tools, from or through this office without the cash accompanies the order for the goods. "On approval," "C. O. D.," or, "Send and I'll remit," will not do us hereafter. We must have the money before we send the goods!

MESSRS HOOPES & MERRY, of the West Side Galvanizing Works, 539 West Fifteenth street, are one of our most enterprising and reliable houses in their line. This firm keeps in stock all the regular sizes of galvanized and block iron, tin plates, solder, sheet zinc, spelter and roofing nails. Roofers and cornice-makers uptown will find their place very convenient and prices as low as those prevailing downtown. Here, also, may be found the best galvanized iron in the city. Messrs. Hoopes & Merry will deliver their goods down town free of cartage, an accommodation that should not be overlooked by buyers.

IF you send thirty-five cents to this office we will send you a special package of drawings, prepaid, by mail. The package contains 16 designs for walltables and sideboards; 15 designs for mantelpieces and cabinets; 5 elevations and plans of cottages; 12 designs for toilet stands, bookcases, etc.; 10 large sized drawings for stair builders, with all the necessary descriptions and explanations. Besides the above the package contains designs for bay windows, fancy picture frames, easels, church organs, organ cases, chairs, beds, pedestals, brackets, Swiss windows, hanging shelves, music stand, newel posts, balusters, tables, sofa, grave railings, inside finish, cabinet workbench, wardrobes, writing desks, and solutions of problems in carpentry and joinery, making up a total of 72 plates, with as many pages of explanatory reading matter. All these drawings were published in the ILLUSTRATED WOOD-WORKER and cannot be obtained from any other source.

FOR two three-cent stamps we will send "Hints on Estimating," a thirty-two page pamphlet, containing rules for estimating on the cost of wood, stone and brick work, painting, tinning, glazing, plastering, and general finish about a house. It gives prices of work and materials, including hardware, paints, glass, etc. The best little book of the kind ever published. We send it prepaid for six cents, or two three-cent stamps.

PRACTICAL LESSONS IN ARCHITECTURAL DRAWING: or, How to Make the Working Drawings for Buildings (an entirely new and original work). Illustrated by 32 full-page plates and 24 woodcuts, showing methods of construction and representation. The work embraces Scale Drawings of Plans, Elevations, Sections and Details of Frame, Brick and Stone buildings, with full descriptions and a form of specification adapted to the same. Suited to the wants of architectural students, carpenters, builders, and all desirous of acquiring a thorough knowledge of architectural drawing and construction. By Wm. B. Tutbill, A. M., architect. One large 8vo volume, oblong, cloth. Price, postpaid, $2.50. This work is having a very large sale, and is appreciated by every one that secures a copy.

THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

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N. B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, 176 *Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } MARCH, 1882. { WHOLE NUMBER, 174 / NEW NUMBER, - 3

The Æsthete.

I have decked my dim-lit bower
With the peacock's plumes I love,
And the dado's dark below,
And the frieze is faint above;
I have decked my dim rich bower
In the last sweet style of Art
With pale plants in a row—
I have made my chamber smart!

The slender tables stand
On waxed and matted floor;
The convex mirrors gleam,
The horse-cloth drapes the door.
'Twas Botticelli's hand
Drew Venus there, so sweet!
I sit, as in a dream,
Close huddled at her feet.

Oh, let me be intense!
I pine, I yearn, I fade,
And my hair hangs o'er my brow,
And my necktie's disarrayed!
My soul is so intense, immense,
My culture is so vast,
I sometimes fancy—who knows how?—
That I shall burst at last!

—*Punch.*

WHO and what is Oscar Wilde? asks a number of our readers. Who he is, concerns us not; what he is would be hard to define. We may say, however, that he is one of the legitimate outcomes of the æsthetic craze. The man himself is just what he seems to be to the intelligent observer. He is a weak, vain, pretentious crank; no more, no less. He will amuse himself in the absurd adulation of his weak worshipers for a season; perhaps he will profit in basket and store by their infirmities; but he will soon be taken at his just value, and dismissed as one of the bubbles of the æsthetic climax that has logically followed the shoddy climax of the last decade. Oscar Wilde, with all his superlative affectation on the ideal, making a miscrable mockery of culture in its own temple, is simply the driftwood of a tide that is in every way beneficient in its offices to mankind. What is inconsiderately called the æsthetic craze is simply the natural rebellion of intelligent judgment against the Oscar Wilde sunflower idealists, who profess to subsist on the fragrance of lilies in the parlor and greedily devour the beefsteak and onions in the kitchen. The so-called æsthetic craze relates to the few who are crazed by every tide, while æsthetic culture has softened and harmonized and beautified the homes of the land, elevated the channels of culture, refined the tastes of every condition of life, and enthroned nature's beauty where the flash and daub of shoddy offended. The cultivation of taste is just, proper, and commendable, but the worshiping of sunflowers and deification of old crockery is as silly as it is absurd.

EVERY man in a workshop ought to constitute himself the guardian of his employer's property, and not only should he avoid waste himself, but as far as practicable he should discourage it in others. If this were done, millions of dollars would be saved to the country; a much larger percentage of profits would go into the pockets of the employer; manufacturers would be enriched, and, in the end, the workmen would be proportionately benefited. Strange that these simple facts should have so little weight; but so it is. Waste by another is cruel to the man who has to pay, it does not, cannot benefit the person guilty of it, and it is a dead loss to the nation. And every scrap of material so destroyed makes the product more costly, and consequently dearer. In the interest of workmen, it is important that these facts should be borne in mind. Wages bear a relative proportion to cost of raw materials, and both combined determine the price of commodities; the cheapness of the latter augments their sale, increases their production, enhances the demand for labor, and tends to keep up wages; the reverse is equally true. If, therefore, an obvious duty is neglected or carelessly performed, the men mainly responsible ultimately suffer, and that suffering will be in an exact ratio to that which produced it.

One great remedy for the losses incurred by waste is a closer supervision of every detail of the undertaking, whatever it may be. This, however, involves extra expense. If the men can contribute to a saving in this respect, they will indirectly reap the advantage. To overlook this fact shows a lamentable ignorance of the internal economy of a workshop, and of the forces and influences always at work for the purpose of bringing about a given result. And the men who complain of strict supervision are just those who need it most, and who, without it, would render large contracts next to impossible, for the simple reason that they would not pay, and could not therefore be executed. Many a builder and contractor has been ruined by the wastefulness of his employes and negligence of his foreman. A careful man is a jewel in a workshop.

THE recent fire in New York has revived the old question of fire-proof buildings. The burning of the Morrell store house on 32d street last fall was a surprise to many, as it was considered fire-proof. Taken in connection, however, with the recent burning and loss of life on Park row, the public is beginning to realize that such a thing as a fire-proof building is not to be found. Iron buildings burn, crumble and collapse with heat, stone offers but slight opposition to the progress of flames when the latter gets a fair head way, indeed, nothing but solid brick and mortar seem to be able to resist the ravages of heat any length of time. Wood when properly protected, makes, all things considered, the best fire-resisting material, with the exception of brick, used for construction purposes. The writer has seen a door frame of two thicknesses of one inch oak screwed together, resist a hot fire, for a period of forty minutes, thereby saving valuable property, and perhaps lives. An iron door

would have warped and twisted to such an extent, that the flames would have lapped around and beyond it, in five minutes. A timber post will sustain its load until the last, whereas an iron one will warp, double up and let the whole structure fall at the shortest possible notice. Three-fourths of the city buildings that take fire are not destroyed by fire; they simply get heated enough to warp and displace the supports, then the whole thing falls in and burns up.

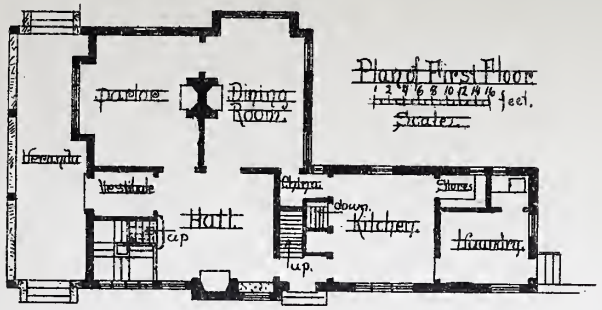
BUILDINGS constructed of wood, with walls and floors made solid by filling in with concrete, mortar or other inflammable material, burn so slowly that danger to life by burning in such cases could not occur without criminal negligence. Indeed, a structure of wood, built as suggested, would rank amongst the best of fire-proof buildings, and more particularly would this be the case if all the timber work was protected by plaster covering, and resinous woods and oil paints avoided. General Meigs, of the War Department, Washington, in an excellent letter to the New York *Herald*, a few days ago, on the subject of the late fire makes use of the following language: "Iron is not fire-proof. It is in fact a combustible, and with heat enough not only bends and yields, but actually burns up. It resists a moderate heat, and when partly covered by brick arches, exposing only the lower edge, it will stand for some time. But in such fires as break out in the great manufactories and warehouses of London, New York, Chicago and Philadelphia, where large quantities of inflammable goods are piled beneath ceilings supported on rolled iron beams they yield, and, in falling, ruin all floors below. If protected by thick plaster upon wire cloth or netting, or by tiles so moulded as to cover the lower side of the lower flange, they will stand longer; but even then I doubt their safety in great fires. Cast and wrought iron in the form of story posts or pillars also quickly yields to the heat of these great and fierce conflagrations. No stone, unless of horizontal section covering more floor space than can be ordinarily spared, will safely resist these fires, and when iron or stone yields it yields suddenly and disastrously. A more unsafe staircase than one of slate upon wrought iron beams can hardly be made. Slate explodes under a moderate heat like granite, but with greater violence. I have seen the occupants of a new log hut in Lookout Valley driven out of it by the flying slate of the walls of its chimney and open fire-place.

Brick is the only real fire-proof material available at reasonable commercial cost, and it should be used in masses of considerable thickness to be safe. Light square pillars will not stand. Piers of some thickness and of considerable horizontal length will long resist fire. The safest story post—*i. e.*, a post supporting a floor at reasonable cost—is one of some hard and not resinous timber. Posts of oak, of fourteen inches square will stand safely through almost any fire, until the powerful force and means of our city fire departments are able to quench the fire. If wrapped with wire netting, covered afterward with plaster, they will suffer still less; but the naked wooden post will remain cool and strong in its center for hours, and the fire will not for a long time char it to a depth sufficient to much injure its strength."

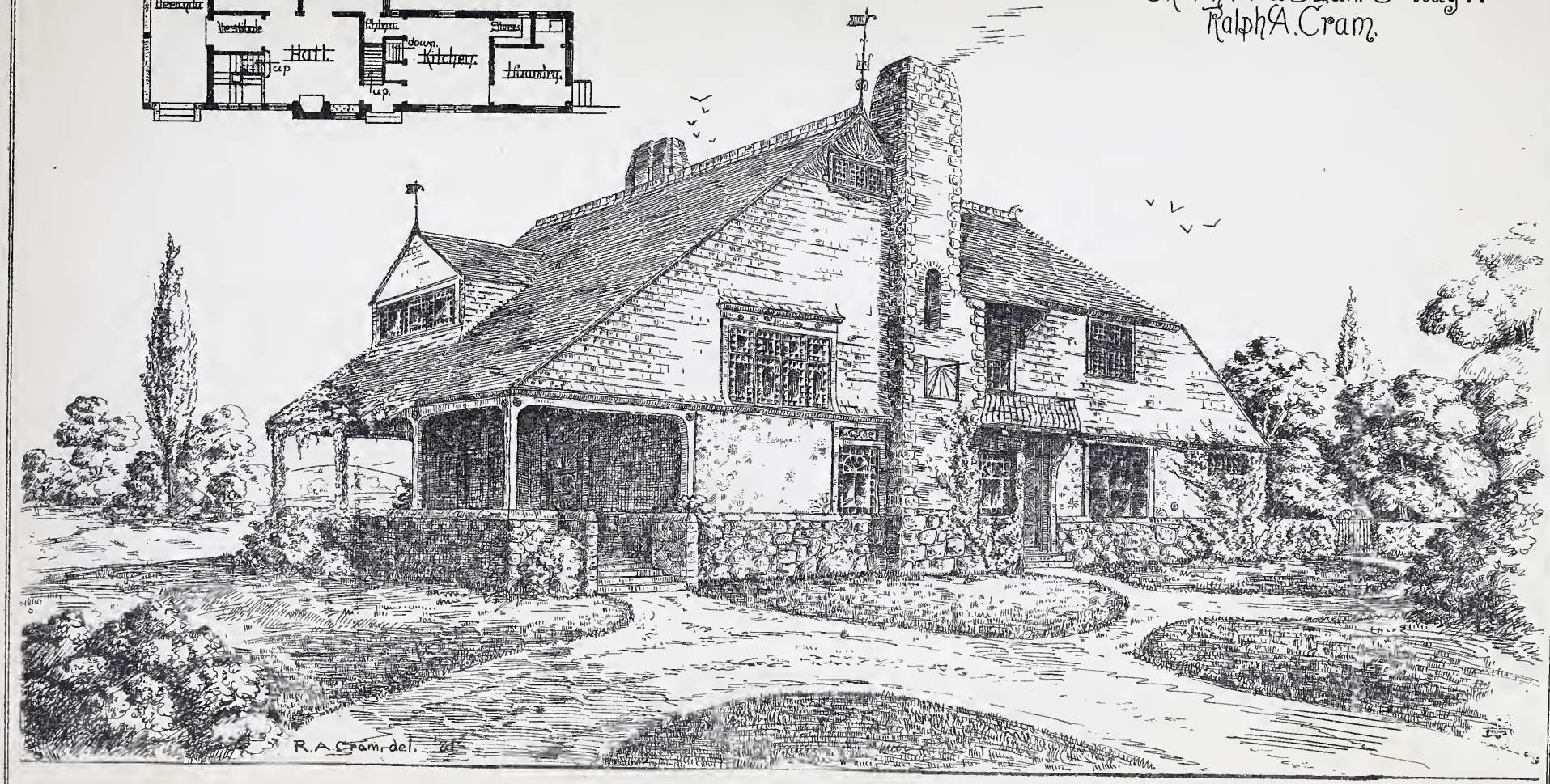
WITH regard to fire-proof floorings, we cannot do better than quote from the same letter, wherein a number of excellent suggestions are given on this subject: A not very costly and a very fire resisting floor is described in the old books on carpentry. It is in a room sixty feet square in Amsterdam. It is built of three thicknesses of one and a half inch plank, tongued and grooved, well nailed and laid crossing each other at different angles. The edges of the floor rest on offsets all around the walls. It is reported as very stiff and strong. Air would circulate but slowly through such a floor, and if between the two lower layers of plank a course of felt or of strong paper were laid all such circulation would be cut off. Even this floor would be safer—*i. e.*, it would resist fire longer—if it was plastered on wire netting on the under side. A good floor can be made on the plan so well advocated by Mr. Edward Atkinson with one or two layers of thick plank tongued and grooved or splined, resting on stout beams eight to twelve inches wide and of depth to give the necessary strength. For this floor he recommends a course of plastering on wire netting, inclosing the beams and following the lower surface of the plank so as to leave no empty concealed spaces in which fire can find a hidden lodgment and way to spread. The modern Roman floors are very generally laid on stout, rough beams, flattened on top, placed at such intervals that the broad, thin bricks or tiles used in Italy can be laid so as to span the opening between the beams; a second layer of bricks or tiles laid in mortar (all Roman mortar is a cement of sand, lime and puzzolana, a volcanic cement) completes the strength of the floor. It is in the better houses finished with marble tiles or with a fine concrete of cement, lime, sand and broken bits of marble, of red, hard burned bricks or of pottery, which, after setting hard, is rubbed down with sand and polished, making either a close imitation of breccia marble, or, if red brick or pottery broken from the body of the stucco, then it is what the Romans in Pompeii called *opus signinum*. The ceiling below is plastered and the floors are almost incombustible.

All stone stairs and posts are dangerous in great fires. Limestone calcines, sandstone cracks, granite and slate explode into fragments. Captain Shaw, of the London Fire Brigade, in an excellent treatise published in 1872, stated that his men were not permitted to enter, in case of fire, warehouses in which there were iron or stone story posts or floor beams, or even to attempt to use stone stairs. He had seen stone stairs lying in a heap at the bottom of the stairwell after a very moderate fire. In Rome the stairs are universally of brick. The landings are brick arches of very slight rise turned across the ends of the stairwell or staircase, the flights of stairs rest on inclined, rampant brick arches springing from the edge of one landing to the next above at the other end of the well. The upper surfaces of these arches are brought to the form of a flight of steps. For beauty the treads, and sometimes the risers also, are made of thin slabs of stone, generally either Travertine stone or marble, which is abundant and cheap in Italy. These are very handsome, stately stairs, not very costly, and as nearly fireproof as can possibly be built.

THERE is another thing in connection with floors, and that is that they should be so constructed as to be in a measure water-tight, and on the same principle as the deck of a ship, so that in the event of a fire in the upper stories the damage which now necessarily ensues, by reason of the deluge of water applied, may be obviated; in other words, let the floors of buildings be calked, so that they should be perfectly water-tight, and whether water should be spilt by accident or by design, as in the case of fire, no damage to the goods stored beneath would occur. The first thought which occurs to one is that in the event of a hose being turned on to an upper story, the water, finding no outlet, would flood the room to any depth, but by providing a gutter round each room communicating with pipes piercing the walls and carrying away the water as a rain water pipe now does, would remove this danger. No doubt were this plan carried into effect, the first cost of erection would be somewhat increased, but to the person intending to use



Sketch for a Small Cottage.
Ralph A. Cram.



any particular house for the storage of valuable and perishable property, it is well worthy of consideration whether it would not in the end "pay" to adopt the plan, in preference to having a whole house full of property damaged or spoiled by the supply of water to a fire occurring in an upper room.

SOME time ago an illustrated contemporary made the following astounding, but somewhat truthful statement, that "foreign workmen are skilled in their trades, take a pride in them, and are not above their business. The young Americans have foolishly imbibed a contempt for manual labor and want to be gentlemen—to become counter-jumpers, or salesmen, or bookkeepers, or anything else that will enable them to keep their hands soft and clean, and to starve miserably on three or five dollars a week. The most skilled mechanics we now have are of foreign birth and education, and they are naturally preferred to ignorant and unskilled natives."

It is not true that all foreigners are skilled in their trades, and that they take a pride in them. We have seen many European workmen that could do but one thing, and that but very poorly, and we have seen others who palmed themselves off as good tradesmen, that were the worst specimens of mechanics ever made. The intellectual dullness of foreign mechanics is proverbial. Set them to work they have not been accustomed to, and they are out of their element at once. Not so with the native workman; his native sharpness and natural mechanical acumen tells heavily against the long parrot-like training of his alien fellow workman.

It is not true that even a majority of "young Americans have foolishly imbibed a contempt for manual labor." We count several thousand young Americans among our readers who are proud of their positions and standing as mechanics as was ever any foreign workman, and who delight in being known as mechanics and whose greatest ambition is to be known as good competent workmen.

It is true, however, and we are sorry to record it, that many of our young men prefer to be made clerks, bookkeepers, counter-jumpers, or anything else that will enable them to keep their hands soft and clean, than to be a skilled and independent mechanic. This is due in a great measure to our false social system. The man whose hand is hardened with toil is considered by empty-headed noodles and purse-proud fools, as something to be tolerated only, and not at all fit to be admitted under the same roof, as the fellow who hands a few laces or spools of thread over a counter. This state of affairs, however, will soon die out, the American people are too sensible to allow it to exist for any great length of time. The toiling mechanic has improved his condition very much of late, and there are forces at work that will, ere long, place him on a much higher plane than he now occupies.

The introduction of scientific appliances and labor-saving machinery have revolutionized the routine of most of the mechanical trades. Processes which were formerly performed slowly and laboriously by hand, and which could be well performed only after years of careful training, now require but the adjustment of a machine and the movement of a lever. Brain work is coming more and more into demand and taking precedence over manual dexterity. We cannot but rejoice at this.

It has already brought to the masses shortened hours of labor and increased leisure for self-improvement. It tends, too, not only to lessen the severity, but to elevate the character of mental toil. It helps not only to realize Shelley's dream by giving the work-weary time to think, but to compel them to think by making intelligence and thoughtfullness the conditions of success in their every-day pursuits, and this leads us to the point we wish to make. Given all things equal, the American mechanic is in a better position and is a more desirable workman to engage by American employers, than the general foreign workman that visits our shores.

Our Illustrations.

ON PLATE 17 we show a rather pictnresque cottage, designed by Ralph A. Cram, of 85 Devonshire st., Boston Mass.

The materials of this cottage are as follows:—From the grade to the sills of the windows of the first story, an old, gray, mossy stone wall is used. Then rough cast plaster to the second floor. The shingles in the gables are stained a silvery gray, the roofs are dark India red and the rest of the woodwork is stained a dark bronze green. The interior is finished in natural woods.

On Plates 18 and 19 we show elevations and plans of some nicely built houses on 165th street, New York City, built by the New York Mutual Improvement Co., limited. Architect, F. T. Camp, N. Y.

These are brick cottages, with galvanized iron cornices and leaders, and tin roofs. Size of each 16.8x26.0, two stories, and a one story extension containing kitchen, 11.0x12.0. Plumbing for cold water only, and all arranged as required, in the wastes and drains by the Board of Health. Lots are 80.0 deep—and the location valuable. House and lot can be bought for less than $2,500, and are sold on the installment plan.

On Pl te 20 we show plan and elevation of a railway station, designed by S. M. Howard architect, Wheeling, W. Va.

Plate 21. Shows the interior of a dining room with a simple side-board and other finishings. The design is by Mr. Edward Dawson, art designer, Boston, Mass.

Plate 22. Exhibits another of our sheets for amateurs, prepared by Edward Dawson. We have quite a number of these designs on hand and will soon be able to publish the series complete It is intended to publish about 40 of the designs in THE BUILDER AND WOODWORKER, and the remaining 60 will be added to them and all published on fine stiff paper, thus making 100 fine plates of designs, which, with portfolio, will be sold for $10, or any ten of the designs will be sold for $1. We believe these will be the finest original American designs ever published.

Plate 23. Shows a design for a roomy and convenient bachelor's cabinet. This is taken from an actual example and is the work of our clever amateur friend C. H. P. of Skaneatles, N. Y. We wish more of our amateur friends would follow his example and send us drawings of their work.

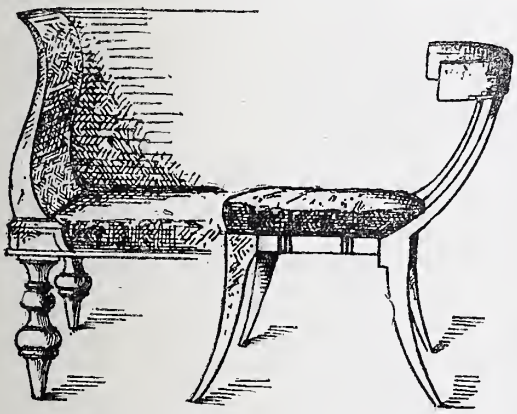
The upper portion of plate 24, and the engravings below, show how old styles may be adapted to modern wants. The designs were contributed by W. Timms, to the *Cabinet Maker*, our clever English contemporary, and from which we clip them and the accompanying text.

Very little of the classic furniture of Greece is reserved for either our admiration or criticism, and we must therefore content ourselves with considering such representations as are preserved upon the pictured vases and sculptures which have escaped the ravages of time.

The chair seems to have received more than ordinary attention among the ancients, doubtless from the fact that it was the first and most important article of domestic comfort. No piece of comfort could vie with it (unless we accept the chariot in this category) in the consideration it received at the hands of the artist and workman.

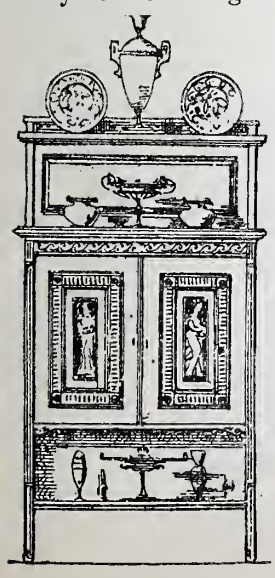
The stools and chairs were made in many different forms, and amongst the most simple was the "Diphos." This was a small backless portable stool, sometimes made with four perpendicular legs, nicely turned, or more frequently constructed so as to fold up, the legs being crossed and the seat formed of straps. It was the fashion among the Athenians to have these stools carried after them by slaves. The chairs which were made for con-

tinual indoor or household use were of larger proportions, and the backs were made in various heights according to the wish of the purchasers, some reaching to the head of the sitter, whilst others reached only to the middle of the back. They were made with or without arms. When arms were applied they were generally low. The species of chairs which mostly resemble the arm-chair of to-day were called "Thronoi." In the home of the Athenian they were reserved as seats of honor both for the master and his guests, and were mostly made of heavy woods. In the temples these chairs or "Thronoi" were the seats of the gods. Those which were reserved for the judges and other eminent men were usually made of metal, and decorated with carved garlands or flowers. Such chairs were also made with either high or low backs, and sometimes they were produced without any back whatever. The arms were placed low, and were, therefore, comfortable. The seats were usually made of the same substance as the rest of the chairs, and Homer tells us that wooly hides, blankets, or bolsters were placed on the seat for the comfort of the sitter. Such an arrangement was evidently in lieu of the upholstery and stuffing now adopted. The footstool is often represented as a part of the chair, and serving both as a step and foot-rest. Those attached to



the sleeping "Kline" had sometimes more than one step, the beds in classic times being unusually high. The footstool was also made separately. Those which extended the whole length of the couch or bed were either made of wood and box-like, or of metal with turned or shaped legs.

That trifling things have given rise to various valued theories is a well-known fact. If the actual origin of every innovation were to be revealed to us, how many curious circumstances would be brought to light. The inventor who kindly informs us of the vast amount of study he has undergone in order to favor the world with some novelty seldom mentions the little trifling incident which gave rise to the grand invention he claims to have thought out. It is just so with furniture, and we who by the lapse of centuries are enabled (so to speak) to take a bird's-eye view of its progression may see and compare the previous trifle with its later improvement. The greatest impetus to such improvements has been necessity, and the next in order luxury. There can be no question what gave rise to the Greek Kline or sleeping couch, for in its earliest form the bed is merely a prolongation of the Diphos; and carrying our observations further, we may see the folding bed which is simply made after the style of the cross-legged



stool. The more elaborate couch with perpendicular legs was at first but an extension of the better class of Diphos, and though it afterwards assumed the more dignified appearance of our modern sofa or settee, its origin was the same, and either necessity or luxury prompted the addition of the sides and back.

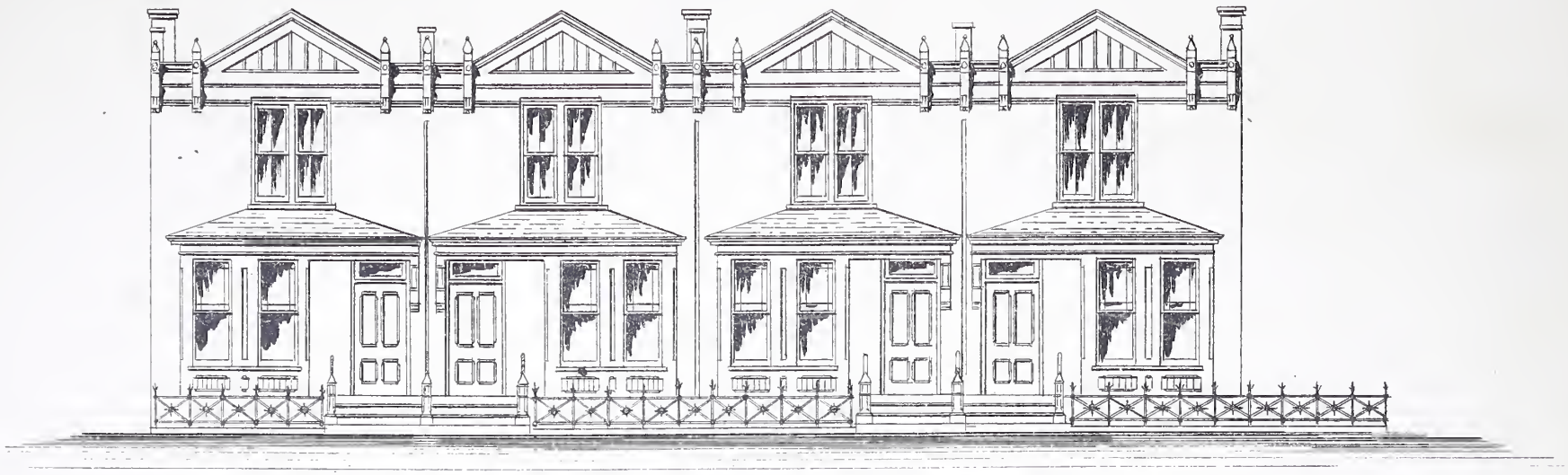
The folding bed was a most useful piece of furniture; it could be easily moved and replaced, and was used both as a seat by day and a sleeping bed by night. They were mostly placed in the outside hall when used as seats, and in case of necessity served as beds for any unexpected guests. When it became the custom to recline at meals, a better class of couch was introduced. The foregoing sketch illustrates a medium example of this Kline. We must not suppose that Homer's descriptive accounts of costly beds and coverings and luxurious furniture were merely the production of his own imagination. They were true descriptions of things both made and seen, but they were not in every-day use. It has already been remarked that the furniture of the heroic ages was simple, but in after times when luxury had gained some footing upon her previous boundary, art was allowed more scope, and the furniture began to be decorated and carved. The "Klines" and chairs were consequently made in more elegant forms and in more expensive materials. Those parts which were not covered with upholstery were neatly carved, and the patterns of the turnery became more diversified.

Besides the ordinary woods, maple or box were used either in the solid or veneered. The frames were sometimes inlaid with gold, silver, or ivory, as is testified in the "Odyssey" and elsewhere. The colors of the coverings were somewhat oriental in character, especially the earliest specimens: doubtlessly this was due to the close connections which the early Greeks had with the various Asiatic nations. The oriental trophies were undoubtedly highly valued by the Greeks, and much borrowed from in their earliest productions. It is difficult to convey an idea of this grand old classic furniture without elaborate illustration, and then the engraving would have an antiquarian rather than a trade interest. In the examples shown setting forth Greek furniture, most of the original features are retained, but applied to "new forms." By thus giving a practical turn to these studies of old styles it is hoped that some fresh thought may be created of a useful character. Some of the designs on the plate herewith are well adapted to modern wants, whilst retaining all the charm of antiquity in appearance.

On the lower part of Plate 24, we illustrate several steel square problems. They were furnished us by Lucius D. Gould, the author of several useful technical works. Full explanations of the working of the problems are given in our correspondence column, which see.

The Cross-Cut Saw.

THE ordinary cross-cut saw is at the same time one of the most primitive and one of the most generally used implements. It is one of the advance couriers of civilization. It penetrates the forest almost with rifle and axe, and far in advance of the surveyor's chain, and once it enters a country it stays there. It remains a useful member of society, despite its crudity. It is its very simplicity that has caused it to be so tenacious of its position among needful implements. It requires no foundations, no motor, no specia preparation. Where the axe leaves a tree, there the cross-



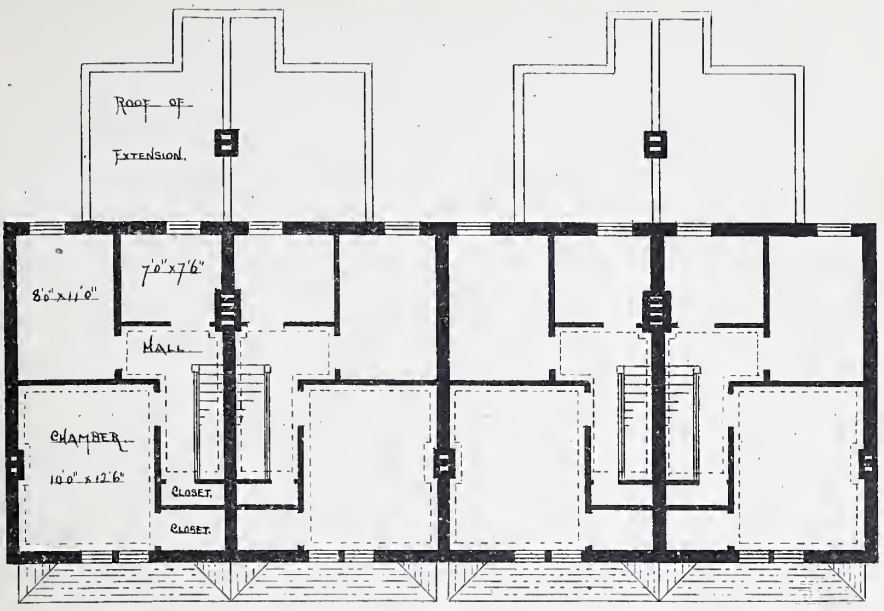
COTTAGES FOR THE N.Y. MUTUAL IMPROVEMENT CO.

BUILT IN 165TH ST. N.Y. CITY.

FRONT ELEVATION.

ARCHITECT CAMP. N.Y.

PLATE No. 19

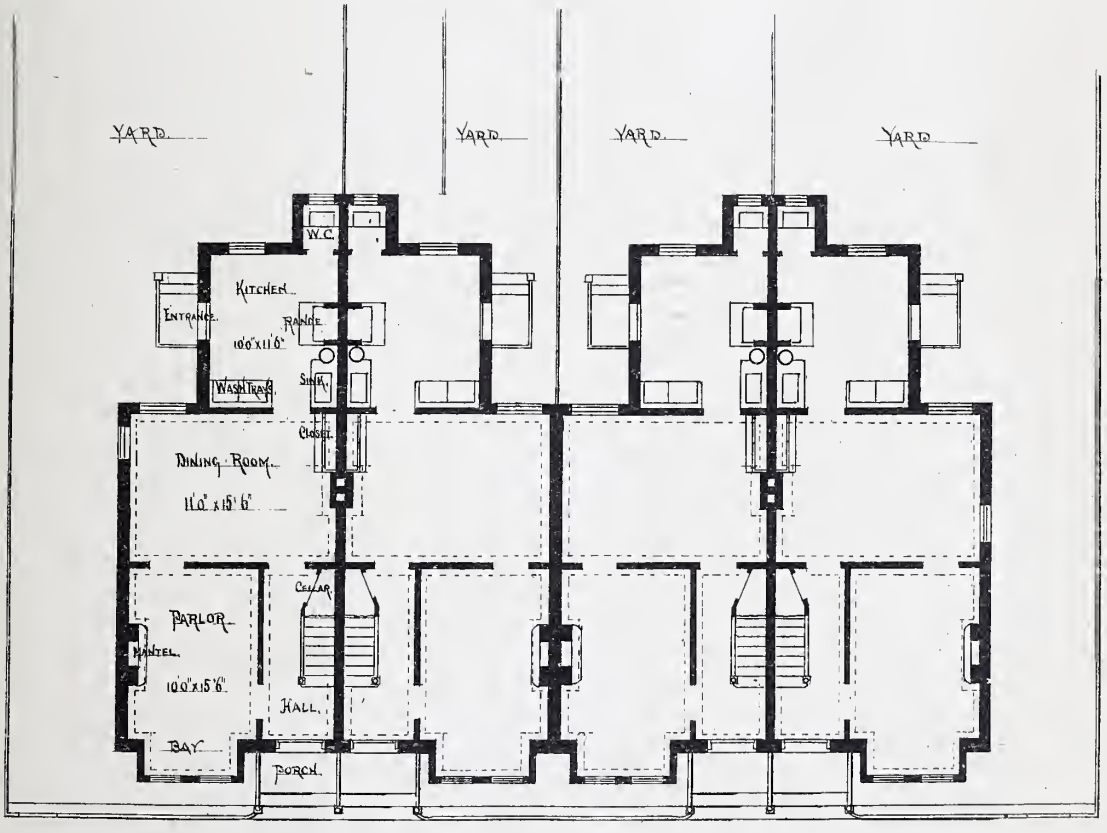


COTTAGES FOR THE N.Y. MUTUAL IMPROVEMENT CO.

BUILT IN 165TH ST. N.Y. CITY.

SECOND STORY PLAN.

ARCHITECT CAMP N.Y.



COTTAGES FOR THE N.Y. MUTUAL IMPROVEMENT CO.

BUILT IN 165TH ST. N.Y. CITY.

FIRST STORY PLAN.

ARCHITECT CAMP N.Y.

cut takes it; and from the newly-fallen log upon the virgin shores to the busy shipyard that succeeds the primeval forest the cross-cut is never hung up. And yet it is an aggravating, fatiguing, slow-working affair. In the first place, it requires great muscular exertion from the weakest muscles of the body. In the second, it not only develops one side of the body at the expense of the other, but by unnecessarily fatiguing one side without giving it any reserve member, it lessens the capacity of the operator, already working at a disadvantage, with weak muscles, to do heavy work. In the third place, in most positions, where the log lies upon the ground, the position of the sawyer is uncomfortable, unhealthy, and still further lessens his capacity for work. In the fourth place, the operator must often clear away a space in the brush and snow for room to work in.

In this country especially there have been many improvements made in the cross-cut, as in all sawing improvements. The heavy bow-frame of sapling sprung into an arc, still used by the cross sawyer in Europe, has no place here. The curved edge of the blade has been brought from the top to the bottom or cutting edge, in order that as the saw wears away in the middle (as it naturally does) the wear of the blade may be taken up, and still leave it a capable tool. In the third place the shape of the teeth has been very carefully chosen to suit various requirements. Cross-cutting has become a regular cutting, and not a mere abrasion. The M tooth has been employed to give the best cutting edge with the best facility for sharpening. Perforations have been introduced along the line of the gullets to lessen the time, labor, and expense of filing, while ensuring that the teeth remain at the proper distance and size, and perhaps cooling the blade. The gullets are made deeper in the center of the edge than at the ends, for the same purpose that the cutting edge itself has been made convex. The handle has become a convenient affair by which the tool may be firmly grasped and guided, and modifications have been introduced by which one man may do very heavy cross-cutting. But with all these improvements the cross cut wears a man out, makes him lop-sided, and uses only the muscles of his arms and shoulders.

The Stability of Structures.

BY. F. E. KIDDER, B. C. E.

IV.

WALLS (*Continued*).

CRUSHING STRENGTH OF STONES, MASONRY, ETC.

BEFORE going further into the subject of walls, it may be well to give the crushing strength of the stones, brick, cement, mortar, etc., used in their construction.

TABLE I.

Average ultimate crushing load in lbs. per square inch for stones, mortars and cements:

STONES, ETC.

	Crushing weight in lbs. per sq. inch.
Brick—common (Eastern)	10,000
" best pressed	12,000
Brickwork, ordinary	300 to 450
" good in cement	450 to 620
" first-class in cement	930
Concrete (1 part lime, 3 parts gravel), 3 weeks old	620
Lime mortar, common	770
Portland cement, best English—	
pure, 3 months old	3,760
" 9 " "	5,960
1 part sand, 1 part cement,	
3 months old	2,480
9 " "	4,520
Granites—7,750 to 22,750	12,000
Blue granite, Fox Island, Me.	14,875
" " Staten Island, N. Y.	22,250
Gray " Stony Creek, Conn.	15,750
1. From tests made for the writer at the U. S. Arsenal, Watertown, Mass.:	
North River (N. Y.) flagging	13,425
Limestones, 11,000 to 25,000	12,000
" from Glen Falls, N. Y.	11,475
Lake limestone, Lake Champlain, N. Y	25,000
White " Marblehead, Ohio	11,225
White " from Joliet, Ill.	12,775
Marbles—	
From East Chester, N. Y.	12,950
Common Italian	11,250
Vermont (Sutherland Falls Co.)	10,750
Vermont, from Dorset, Vt.	7,612
Drab, North Bay Quarry, Wis.	20,025
Sandstones	6,000
Brown, Little Falls, N. Y.	9,850
" Middletown, Conn.	6,950
Red, Haverstraw, N. Y.	4,350
Red brown, Seneca freestone, Ohio	9,687
Freestone, Dorchester, N. B.	9,150
Long Meadow sandstone, from Springfield, Mass.	8,000 to 14,000

WORKING STRENGTH OF MASONRY.—The working strength of masonry is generally taken at from one-sixth to one-tenth of the crushing load for piers, columns, etc., and in the case of arches a factor of safety of twenty is often recommended for computing the resistance of the voussoirs to crushing,

Mr. Trautwine states that it cannot be considered safe to expose even first-class pressed brickwork, in *cement*, to more than thirteen or sixteen tons pressure per square foot, or good, hand molded brick to more than two-thirds as much.

PIERS.—Before considering the subject of walls we will say a few words in regard to piers, which are generally found only in the cellar or basement.

As a rule, piers are more heavily loaded per unit of area of cross-section than walls; for, as the piers take up valuable room, it is desirable to make them as small as is consistent with safety.

The material generally used for building piers is brick; block or cut stone is sometimes used for the sake of appearance, but rubble work should never be used for piers which are to sustain posts, pillars or columns. Brick piers more then six feet in height should never be less than twelve inches square, and should have properly proportioned footing courses of stone, not less than a foot thick.

The brick in piers should be hard and well burned, and should be laid in cement, or cement mortar at least, and be well wet before being laid, as the strength of a pier depends very much upon the mortar or cement with which it is laid; those piers which have to sustain very heavy loads should be built up with the best of the Rosendale cements. The size of the pier should be determined by calculating the greatest load which it can ever have to sustain, and dividing the load by the safe resistance of one square inch, or foot, of that king of masonry to crushing.

EXAMPLE.—In a large storehouse the floors are supported by a girder running lengthwise through the center of the building. The girders are supported every twelve feet by columns, and the lowest row of columns are supported on brick piers in the basement. The load which is liable to come upon one pier is found to be 65,000 lbs. What should be the size of the pier?

ANS.—The masonry being of good quality and laid in cement mortar, we will assume that its crushing strength is 600 lbs. per sq. inch, and taking one-sixth of this as the working load, we find that the pier must contain $65{,}000 \div 100$, or 650 square inches. This would require a pier about 24x27 inches.

It is the custom with many architects to put bond stones in brick piers, the full size of the section of the pier, every three or four feet in height of the pier. These bond stones are generally about four inches thick. The object in using them is to distribute the pressure on the pier equally through the whole mass. Whether the bond stones actually do this or not, the writer believes to be an unsettled question.

Section 3 of the Building Laws of the city of New York requires that every isolated pier less than ten superficial feet at the base, and all piers supporting a wall built of rubble stone or brick, or under any iron beam or arch girder, or arch on which a wall rests, or lintel supporting a wall, shall, at intervals of not less than thirty inches in height, have built into it a bond stone not less than four inches thick, of a diameter each way equal to the diameter of the pier, except that in piers on the street front, above the curb, the bond stone may be four inches less than the pier in diameter.

Piers which support columns, posts or pillars should have the top covered by a plate of stone or iron, to distribute the pressure over the whole cross section of the pier.

In Boston, it is required that "all piers shall be built of good, hard, well-burned brick, and laid in clear cement, and all bricks used in piers shall be of the hardest quality, and be well wet when laid."

"Isolated brick piers under all lintels, girders, iron or other columns, shall have a cap-iron at least two inches thick, or a granite cap-stone at least twelve inches thick, the full size of the pier."

"Piers or columns supporting walls of masonry shall have for a footing course a broad leveller, or levellers, of block stone not less than sixteen inches thick, and with a bearing surface equal in area to the square of the width of the footing course, plus one foot required for a wall of the same thickness and extent as that borne by the pier or column."

WALLS.—Very little is known regarding the stability of walls of buildings beyond what has been gained by practical experience. The only strain which comes upon any horizontal section of such a wall, which can be estimated, is the direct weight of the wall above, and the pressure due to the floors and roof.

But it is generally found necessary to make the wall thicker than the considerations of the crushing strength alone would require.

With the same amount of material a hollow wall is more stable than a solid one, and it also possesses many other advantages over solid walls. The strength of a brick wall depends very much upon the bond. In this country it is a general rule among masons to use as few headers, or bond brick, as they can possibly get along with. The common custom is to make every ninth or tenth course of headers, and build the remainder of the wall of stretchers. Brick walls of buildings should never be less than twelve inches thick below the top floor, and stone walls not less than sixteen inches.

The thickness of the walls required by the laws of the cities of New York and Boston are shown by the following tables:

THICKNESS OF WALLS REQUIRED IN BOSTON.

DWELLING-HOUSES.

HEIGHT OF WALLS.	THICKNESS.				
	Foundation Block Stone.	Foundation Rubble Stone	Foundation Brick.	External Walls.	Party Walls.
Not exceeding 35 feet	16″	20″	16″	12″	12″
Exceeding 35 feet, and not exceeding 55 feet	18″	22½″	16″	12″	12″
Exceeding 55 feet	20″	25″	20″	12″	12″

BUILDINGS OTHER THAN DWELLINGS.

HEIGHT OF WALLS.	THICKNESS.				
	Foundation Block Stone.	Foundation Rubble Stone.	External Walls.	Party Walls—Solid.	Party Walls—Vaulted.
Not exceeding 35 feet	24″	30″	16″ to top of upper floor. 12″ remaining height.	20″ to top of 2d floor. 16″ to roof. 12″ remaining height.	20″ from foundation to under side of roof boards.
Exceeding 35 feet	28″	.....	20″ to top of 3d floor. 16″ remaining height.	Sam as above.	

THICKNESS OF WALLS REQUIRED IN THE CITY OF NEW YORK.

DWELLING-HOUSES.

HEIGHT OF WALLS.	THICKNESS.			
	Foundations.		External walls.	Party Walls.
	Stone.	Brick.		
Not exceeding 55 feet.	20″	16″	12″	12″
Exceeding 55 but not exceeding 80 feet	24″	20″	16″ to top of 2d floor. 12″ remaining height, if not more than 40 ft.	16″
Exceeding 80 feet	8″ thicker than wall next above	4″ thicker than wall next above	4″ thicker than the above for every 15 feet added to the height of the wall above the 80 ft.	16″

BUILDINGS OTHER THAN DWELLINGS.

			Bearing Walls.	Other Walls.
Not exceeding 40 feet	20″	16″	12″	12″
Exceeding 40 and not exceeding 55 feet	24″	20″	16″	12″
Exceeding 55 and not exceeding 75 feet	28″	24″	20″ to height of 20 feet. 16″ " " 55 " 12″ remaining height.	4″ less than bearing wall.
Exceeding 70 and not exceeding 85 feet	32″	28″	24″ to height of 12 feet. 24″ " " 60 " 16″ remaining height.	.....
Exceeding 85 feet	8″ thicker than wall next above	4″ thicker than wall next above	4″ thicker than the above for every additional 15 feet above the 85 feet.	.....

The height of the walls is in all cases measured from the curb-stone of the street.

The New York law further reads: "It is understood that the amount of materials specified may be used either in piers or buttresses, provided the outside walls between the same shall in no case be less than twelve inches in thickness to the height of forty feet, and if over that height than sixteen inches thick; but in no case shall a party wall between the piers or buttresses of a building be less than sixteen inches in thickness.

"In all buildings over twenty-five feet in width, and not having either brick partition walls or girders supported by columns running from front to rear, the wall shall be increased an additional four inches in thickness, to the same relative thickness in height as required by the table given, for every additional ten feet in width of said building or any portion thereof.

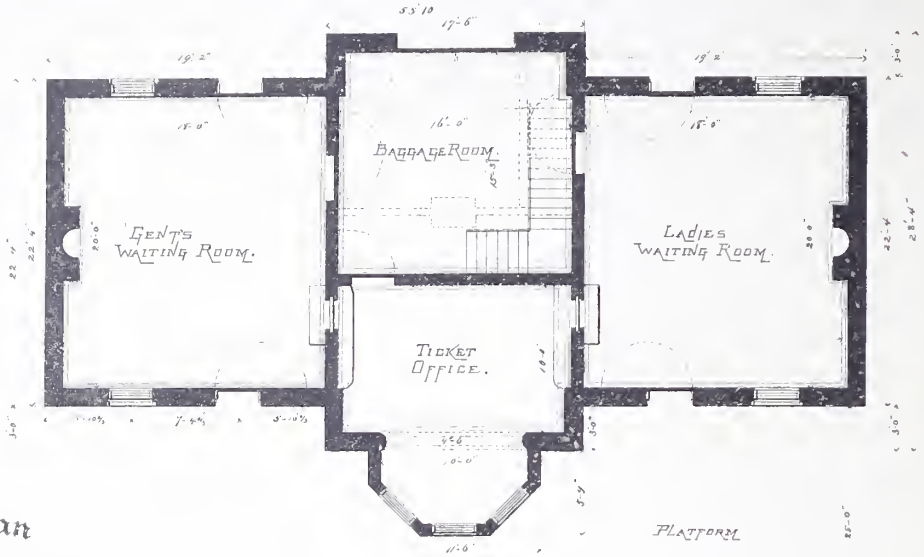
"In all buildings hereafter erected, situated on the street corner, the bearing wall thereof (that is, the wall on the street upon which the beams rest), shall be four inches thicker in all cases than is otherwise provided for by this act All walls other than bearing walls may be four inches less in thickness than required in the provisions of this act (and the table), provided no wall is less than twelve inches in thickness."

In addition to the requirements indicated in the table, the Boston building laws make the following: "*Vaulted party walls* may be used instead of solid walls. They shall be built at least twenty inches thick from the foundation walls to the underside of the roof boarding. Said walls shall be constructed of two outer walls of equal thickness, with an air-space between them of four inches, and tied together perpendicularly with continuous widths of hard-burned brick of good quality, which shall be not more than three feet apart. The air-space shall be smoothly plastered.

"Every building hereafter erected more than thirty feet in width, except churches, theatres, railroad station buildings and other public buildings, shall have one or more brick or stone partition walls, running from front to rear, and carried up to a height not less than the top of the second story floor joists, said wall or walls may be four inches less in thickness than is called for by the tables; these walls shall be so located that the space between any two of the floor bearing walls of the building shall not be over twenty-five feet."

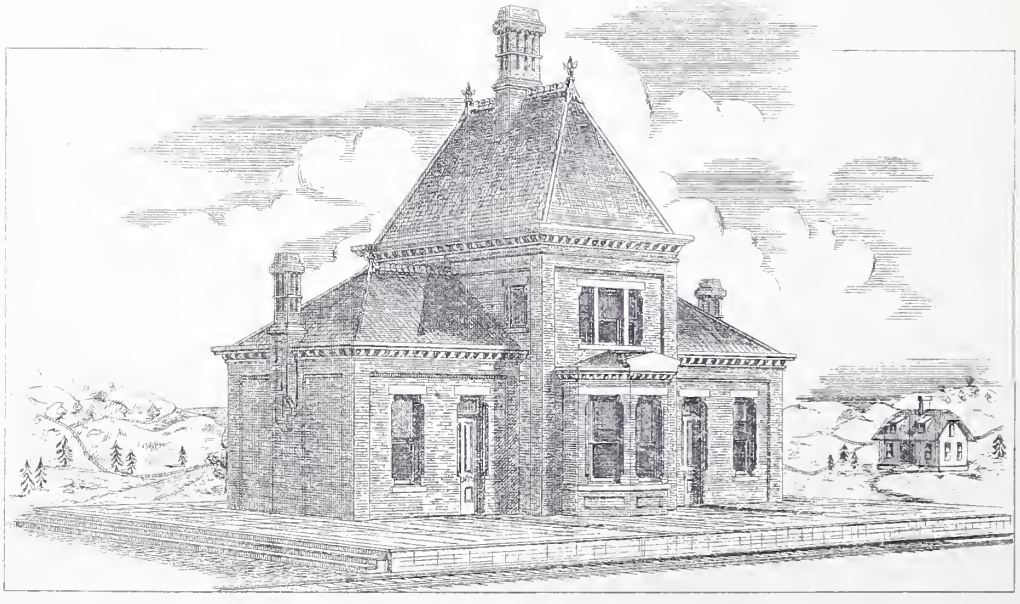
"Exterior walls, faced with stone, shall have a backing of not less than eight inches of hard brickwork laid in mortar. But in no case shall the thickness of stone and backing, taken together, be less than the thickness required for a brick wall of the same height."

PLATE No. 20



Plan of Railway Station.

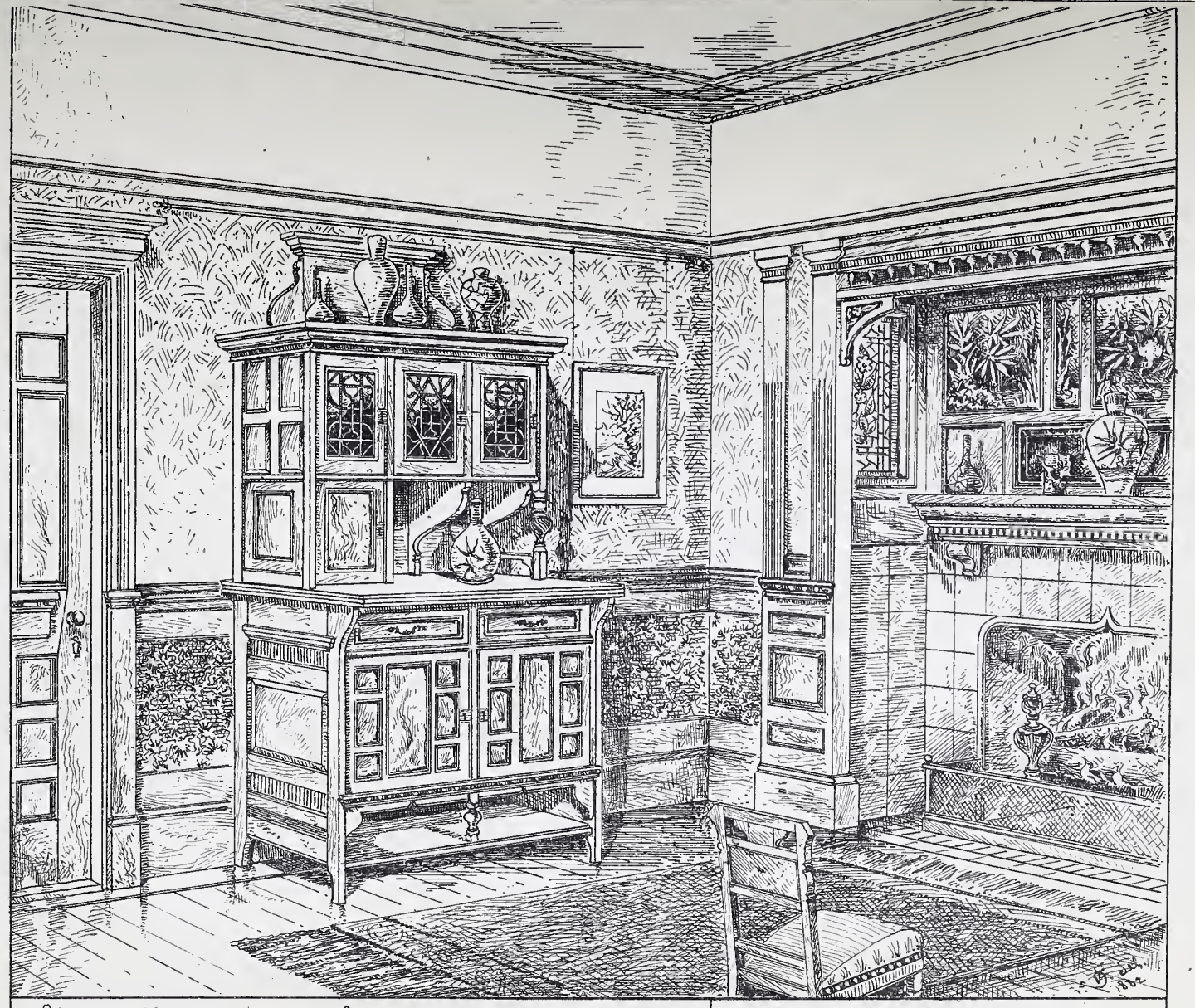
S.M. HOWARD - ARCHT.



DESIGN FOR A RAILWAY STATION.

S.M. HOWARD - ARCHT.

WHEELING, W. VA.



Simple Dining Room Side Board, and Fittings; in Cherry. finished drawing.

EDWARD DEWSON: ARCHT.
28 STATE ST. BOSTON.

"In every brick wall, every ninth course of brick shall be a heading course, except in walls built with some bond in which as much as every ninth course is a heading course, and except where walls are faced with face brick, in which case every ninth course shall be bonded with Flemish header or by cutting the course of the face brick, and putting in diagonal headers behind the same, or by splitting face brick in half, and backing the same by a continuous row of headers."

"All heading courses shall be of good, hard, perfect brick."

Intercommunication.

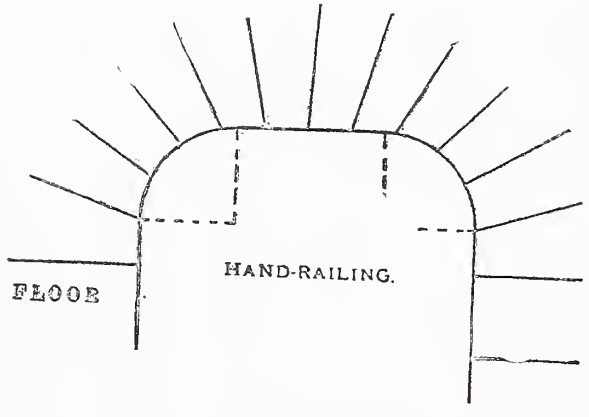
This department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Queries.

25. GEOMETRY.—Will some of our able contributors inform through these columns how I can learn Geometry, or that branch of it that is the most useful for a practical carpenter and joiner?—H. B. B.

26. HAND-RAILING.—Would some brother chip that knows all about stair-railing, draw the elevation of pitches for a stair as shown below? If possible the two pieces of wreath to have equal



pitches and the straight rail between cylinders to have same pitch as stairs have in that place, and if not possible, show us the reason why. Riddell's system is preferred.—H. B. B.

27. SUMMER HOUSE.—I want to build a summer house, and also a small grape arbor this spring, but am at a loss for appropriate designs. Can any fellow "chip" help me out of my difficulty?—"E. A. B."

28. RUSTIC LAWN SEATS.—If Mr. Woodruff, Mr. Dewson, or L. E. L. would give us a plate in the April number of the B. & W. containing a few designs of rustic and Queen Anne lawn seats, I am confident it would be appreciated by many.—CANADIAN AMATEUR.

29. STAIR SOFFIT.—How can I find the various lines and bevels for the construction of a panneled soffit for the under-side of a circular stair?—B. G. W

30. WINDERS.—Is the rail or winding stairs affected in height when the winders don't radiate to the center of cylinder? If it is, will some reader give a remedy?—G. B. W.

31. THICKNESS OF HANDRAIL.—Can hand rails be got out of stuff no thicker or wider than the rail is wide? If so, will some reader give an example, say a side wreath starting from a newel, of the method of finding the mould and its application to the plank to give the wreath its cylinder form?—W. B. G.

32. GILDING PICTURE FRAMES—Can any of your numerous subscribers give directions for gilding picture frames, &c., so as to show the grain of the wood, and what wood is used. Also, how can stain a white marble mantel piece to make it darker, yet still retain its polish?—H. M.

33. PLANING MILL.—I would consider it a great favor if T. T. L., or some other equally clever contributor, would publish a plan of a planing mill in these columns. Such a plan I am sure would be appreciated by many of your readers besides.—L. N. N.

34. RENOVATING OLD FLOORS.—Will some of your readers, who have had experience, advise me how to dress and finish the edges of a pine floor several years old and slightly splintered on the surface, so that it will look well for use with carpet rugs. Must I paint it, or can I stain and polish it and how? Can it be smoothed off without planing, and how?—H. M.

35. OIL FINISH.—I wish some brother reader would inform me as to the proper method of making and applying a good oil finish. I wish to finish up some walnut work in this style, and will feel obliged for information on the subject.—ST. LOUIS SUBSCRIBER.

36. POLISHING TURNED WORK.—I would like to know how turned work is polished. Also how flat surfaces are made to appear so very even and regularly smooth.—ST. L. S.

37. DRAWING BOARD AND TABLE.—Will some one furnish a design for a drawing table, or a combination of library desk and drawing table? Such a design would be appreciated by—C. H. P.

38 GRINDING TOOLS.—A few hints on grinding edge tools would be very serviceable to an—AMATEUR WOOD-WORKER.

39. PAINTS AND OILS.—Will some one kindly answer the following questions: (1) How can I tell when white lead is unadulterated? (2) By what method can I determine that boiled or raw linseed oil is pure? (3) How can I prepare a white paint that contains neither white lead or white zinc, suitable for interior decoration? (4) How can adulterated sperm oil be known from the pure? (5) Will B. J. Z. inform me how to find the length of a brace with the slide rule for a 3 ft. run; also one for a 3x4 ft. run; also give the rule for multiplying double numbers, such as say 47x87 and 221x42, on the rule? I should feel very much obliged to B. J. Z. if he will give a few more instructions on the slide rule question.—W. H. CODE.

40. CONCRETE BUILDING.—Would be glad if some of your contributors would inform me how to make concrete building blocks. Cost per cubic foot each, of quick lime and cement. There is any quantity of good lake sand and gravel in this vicinity.—MASON.

Answers.

We wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

1. PLACING BRACKETS.—When there are double posts or columns to support the frieze to a veranda, brackets in pairs, one over the other, are very proper. I do not consider it proper to put them in pairs where there is no apparent support below them. When used simply for ornamental purposes it is better to use them singly, at regular intervals. They often place them thus, when at same time they are in pairs over supporting columns.—R. C. H.

2. HAND RAILING.—I have used black birch some, for handrails, but much prefer cherry or black walnut. For balasters, I have used black birch largely, and like it much. When it is properly stained and varnished or polished it makes a better imitation of mahogany than any other wood with which I have become acquainted in a practice of nearly thirty years.—R. C. H.

13. BRICK COTTAGE.—Surely J. A. Z. is crazy, crazy on two points: 1st, to think that anything like a decent cottage can be built for $1,500, and (2) to suppose that an architect would get up a design for his *special* purpose, and give it him free of charge. He might just as well ask a carpenter to give him a few sample doors and windows, the bricklayers to give him a week's work, and the painter to decorate a room or two as samples, all free of charge.—ARCHITECT.

14. CAR BUILDING.—(1). The business is not overdone, there is still room for other shops in the West. (2). If timber, coal and labor are as cheap, and transportation facilities are as good as in other localities, then the abundance of iron may be of advantage. The price of iron is nearly the same in all parts of the United States. For books on car building, etc., address *National Car Builder*, 5 and 7 Dey street, New York, N. Y.—WOODBINE.

15. TOOL CHEST.—J. B. A. should see the May No. of the B. AND W. W. for 1881. A very nice tool chest is shown in that number.—NIFF.

15. TOOL CHEST.—A drawing, which came too late for this issue, will appear next month.—EDS.

16. SLIDE RULE.—The principle governing the working of the slide rule is the same in all rules. There are different forms of the rule, that is—some rules are made with 6 "joints, some with 12," and others, like Riddell's rule, have no joint. For office work I

prefer Riddell's rule, but for general purposes the single jointed two-foot rule, such as the No. 27 bound rule, made by Stephens & Co., Riverton, Conn., is by far the best, I think.—B. J. Z.

17. Books.—J. B. A. should secure a copy of "Practical Lessons in Architectural Drawing," by Tuthill, and "Reed's House Plans for Everybody," and I think he will have two books that will suit him exactly.—Eph. B. Repp.

17. Books.—The following books are the ones I have used, and found of great help in my architectural studies:

	Price
Gwilt's Encyclopædia of Architecture	$20 00
Lakey's Village and Country Houses	5 00
Steppingstone to Architecture	60
Powell's Foundations	1 50
Camp's Draftsman's Manual	50
Vogde's Price Book	1 50
Building Construction (3 vols.)	13 00
Hatfield's House Carpenter	5 00
And Warren's 3 Elementary Books on Drafting and Instruments	3 75

One hundred dollars wisely expended will supply a fair number of hooks for a student who is just beginning to read up in architecture.—Architect.

18. Wood-filling.—For a good article on wood-filling and finishing, see Answer to Correspondent in July number, 1881, of Builder and Wood-Worker.—Constant Reader.

19. Risers and Treads.—The table is simple enough. Suppose you have a flight of stairs to build, where the distance from top of floor to top of floor is 12 ft. 6 in., you desire to make the risers 6¼ inches and the treads 10½ inches. Then look at the table and find 6¼ on top of column; run down this column to 12.6, which, in this case, is the 24th row down from the top. Run now to the left under the column of risers and on a line with 12.6, the height of the stairs will be 24—the number of risers required each to be 6¼ inches high. Find 10½ on top of table, then run down to the 24th line—the number of risers—and you will find 21, the number of feet in the rear of the stairs. Always remember that there is one less of treads than risers.—Stair-Builder.

21. Covering Desks and Tables with Cloth.—The following is said to be an excellent method of fastening cloth to the top of tables, desks, etc.: Make a mixture of 2¼ pounds of wheat flour, two tablespoonfuls of powdered rosin and two tablespoonfuls of powdered alum; rub the mixture in a suitable vessel, with water, to a uniform smooth paste; transfer this to a small kettle over a fire, and stir until the paste is perfectly homogeneous, without lumps. As soon as the mass has become so stiff that the stirrer remains upright in it, transfer it to another vessel and cover it up so that no skin may form on its surface. This paste is applied in a very thin layer to the surface of the table; the cloth, or leather, is then laid and pressed upon it and smoothed with a roller. The ends are cut off after drying. If leather is to be fastened on, this must first be moistened with water. The paste is then applied, and the leather rubbed smooth with a cloth.—Neff.

22. Gilding.—You may find out whether gilding is genuine or not by the fact that on the latter a weak solution of proto-chloride of copper produces a black precipitate, which it does not on the former. In the case of gilt paper, the simplest method consists in slowly burning the paper in a bright flame, that gives out no smoke: in the incinerated remains of good gilt paper there are traces of the gold left behind, which are quite perceptible to the naked eye, in the shape of glittering spots, whilst vile metal on paper oxidizes in burning, and leaves nothing but a sort of red spots behind. This method, however, is scarcely accurate enough; a very much safer test is to be found in the use of mercury, either in metallic shape or in solution of salts of mercury. The former test is performed by putting a few drops of pure quicksilver on the gilt article, and either rubbing it in or slightly heating it. If the gilding be genuine, though ever so thin, the mercury combines itself with it, producing white spots on the surface. This does not occur in the case of sham-gilding, and in rubbing mercury in, no change of color whatever is to be noticed. Another test consists in the application of a watery solution of nitrate of mercury. In this case the exact opposite takes place as in the former, for genuine gilding remains intact, whilst a "duffer" at once takes a white color when brought in contact with the precipitate of mercury.—Ibid.

23. Walnut Stain.—Walnut stain for pine and whitewood, take 1 gallon of very thin sized shellac; add 1 lb. of dry burnt umber, 1 lb. of dry burnt sienna, and ¼ lb. of lampblack. Put these articles into a jug and shake frequently until they are mixed. Apply one coat with a brush. When the work is dry, sandpaper down with fine paper, and apply one coat of shellac or cheap varnish. It will then be a good imitation of solid walnut, and will be adapted for the backboards of mirror frames, for the backside and inside of case-work, and for similar work.—Ibid.

23. Walnut Stain.—If "Doubtful" was to make a walnut stain of burnt umber and turpentine, he would find it to answer all practical purposes, with good results. By adding more or less turps. he can get any depth of color he may require.—E. C. Chowins.

24. Glazing.—The proper way to put in glass is to both bed it and back it with putty.—Old Hand.

24. Glazing.—J. L. N. will certainly find it the best way of glazing, "to bed it with putty." The other mode of "backing it" should at all times be discarded.—E. C. Chowins, Crete, Neb.

Correspondence.

[The Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor of the Builder and Wood-Worker:

I have looked over the letters you placed in my hands, and thought it would be better to give a few examples of operation in the slide rule through your valuable medium, on matters outside the building interests, than to answer each inquirer by mail. No doubt the following solutions will be interesting to many of your readers besides those to whom they are addressed. At all events, they will have the effect of showing that the operations of the rule are nearly unlimited in their application:

Ans. to M. E. A.—The following formula for calculating the lifting power of a "double cylinder" steam winch is another notable illustration, in addition to several I have already given, of the value and power of instrumental calculation.

The elements which enter into this calculation are six in number, viz., the pressure of the steam, the diameter of the cylinders, the length of the crank, the number of teeth in the pinion, the number of teeth in the wheel and the radius of the chain barrel, and there are three shifts of the slide required in working the question.

First. "Set the length of the crank in inches on B to the number of teeth in the pinion on A, then against the effective pressure of the steam on A is the first result on B."

Second. "Set the first result on B to gauge point 22·4 on A, then against the diameter of the cylinder on D is the second result on C."

Third. "Set the second result on B to the radius of the chain barrel on A, then again the number of teeth in the wheel on A is the lifting power in tons on B."

Let the effective pressure be 21·25 lb. per square inch; the diameter of cylinders, 6·375 in.; length of crank, 4,625 in.; number of teeth in pinion, 15; number of teeth in wheel, 87; radius of chain barrel, 6·25 in.

How many tons will it lift?

First. Set 4·625 in. on B to 15 teeth on A, then against 31·25 lb. on A is first result 96 on B.

Second. Set 96 on B to gauge point 22·4 on A, then against 6·375 in. (diameter of cylinder) on D is second result 174 on C.

Third. Set 174 on B to 6·25 in. (radius of chain barrel) on A, then against 87 (teeth of wheel) on A is 2·42 tons on B = the lifting power of the winch.

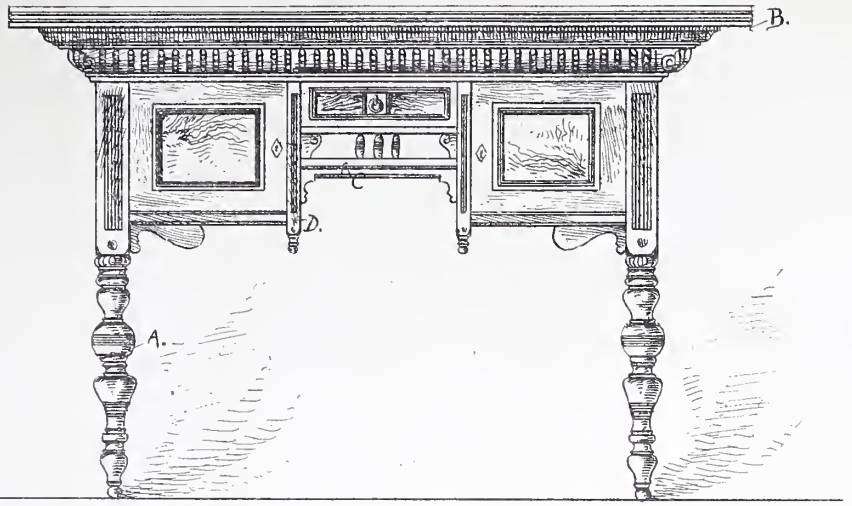
I have designedly introduced several fractional numbers into the above calculation in order to make it more difficult and tedious to any of your readers who should wish to work it out arithmetically, as thereby the contrast between it and the instrumental process may be made more remarkable, seeing that fractions or mixed numbers are no more difficult or troublesome to the adept on the slide rule than whole numbers.

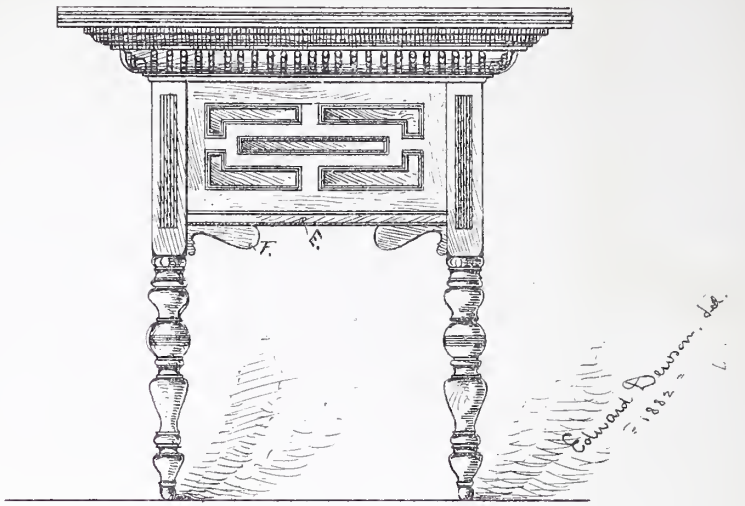
R. S. wishes to learn how to find by the slide rule the proper change wheels to use in cutting screws, and he gives an example of a screw to be cut of one millimetre pitch, or 25·44 threads per inch, English, the leading screw of his lathe having four threads per inch. Such a screw cannot be cut with the wheels generally supplied with our lathes, which increase by fives generally.

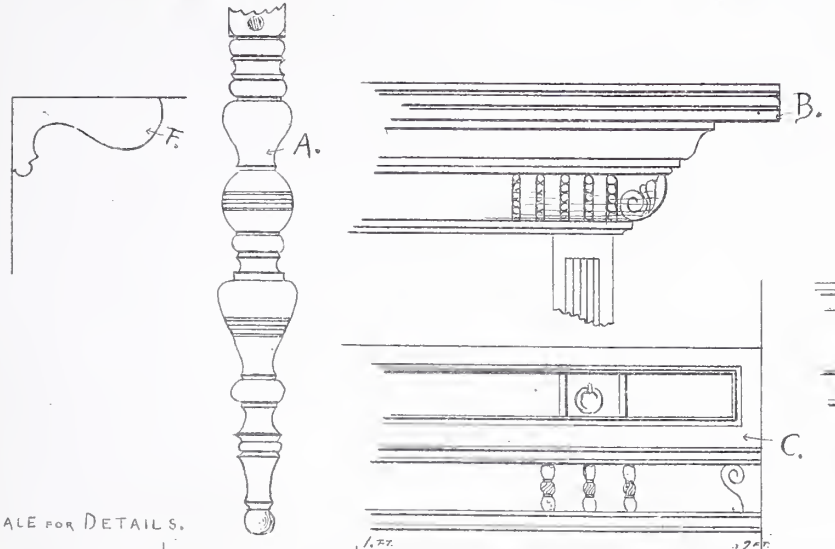
R. S. must therefore make a wheel with 159 teeth, and put it on the leading screw, and if he drives it by a 25 on the mandril, he will cut millimetre pitch, or 25·44 threads per inch English with absolute accuracy.

To work this out the slide should not be inverted in finding screw cutting wheels, as will be seen when I describe the method I have used for many years. I think it will be acknowledged to be an exceedingly simple formula, and is applicable to all cases, both of coarse and fine screws, except such as R. S.'s impossibility. As example is better than precept, let us take an example of a fine screw first, say 24 threads to the inch, the leading screw having two threads to the inch, and say the set of change wheels are from 50 to 150, both included. Set 24 on B to 2 on A, then A is a table of wheels for the mandril and B a table for the leading screw (which will cut the required screw with single train); thus on A we have 10, 15, 20, 25, 30, against 120, 180, 240, 300, 360, on B; now as the set of wheels does not furnish a single pair corresponding to any of these we must find a compound train thus:—Let us take the 20 on A for the mandril (as it is a good size to work with) and the 240 against it on B we will reject, and adopt instead of it

BUILDER AND WOOD-WORKER "HELPS TO AMATEURS SERIES"







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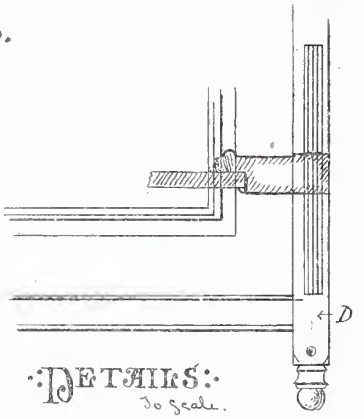

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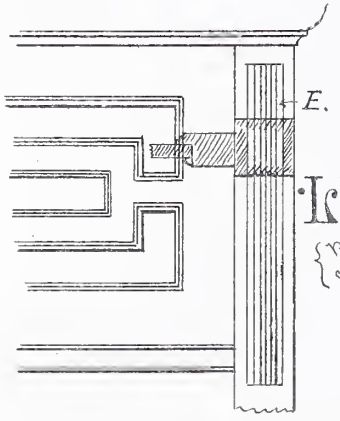
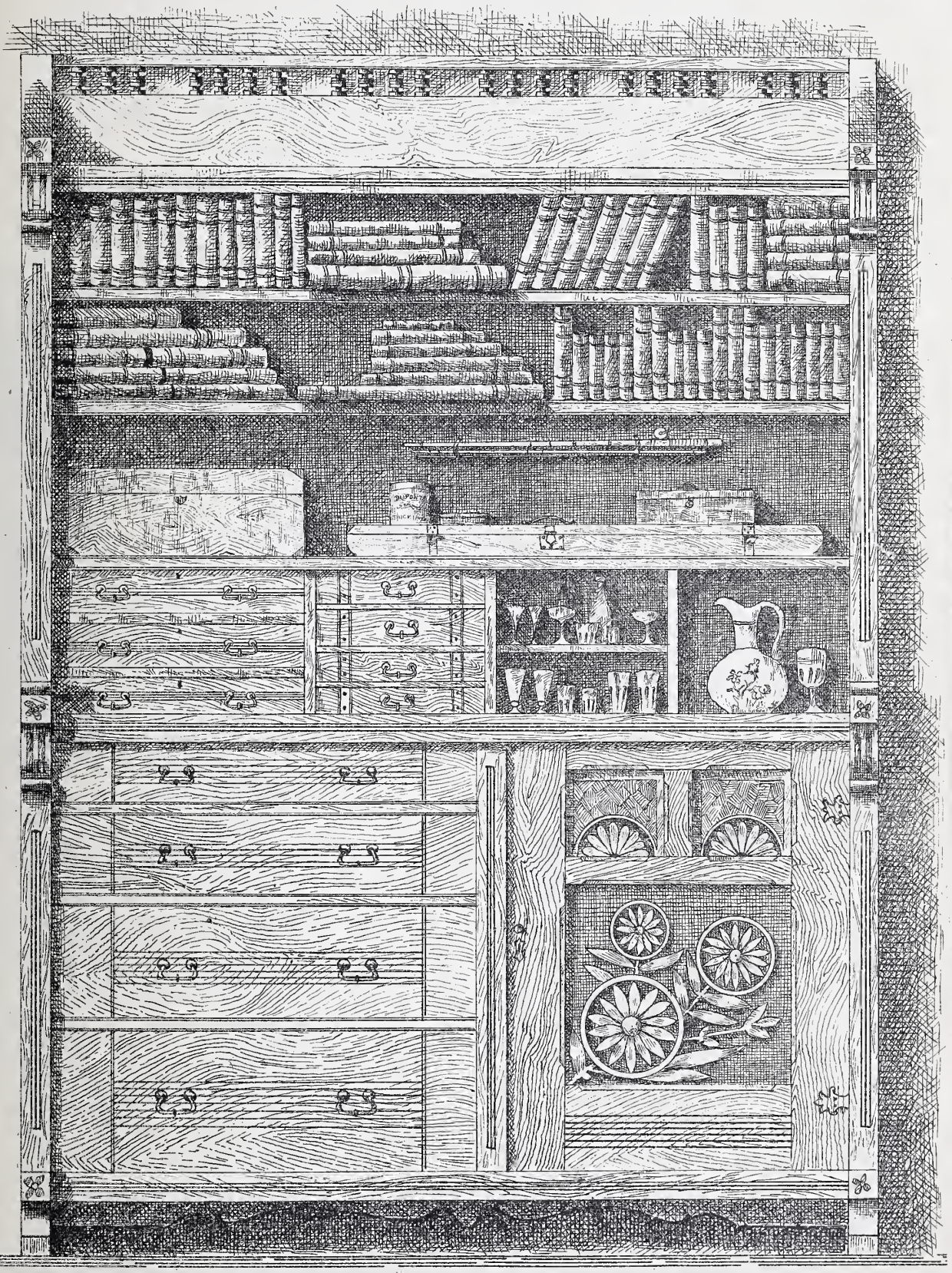


LIBRARY TABLE.

{Build of any hard wood and finish with a rubbed gloss.

SCALE FOR ELEVATIONS.
1 FT.

PLATE Nº 23



Bachelor's Cabinet (Butternut)

C.H.P. Skaneateles N.Y.

some other large wheel that we have—say, for instance, the 120 Then set the rejected wheel (240) on B against the adopted wheel (120) on A ; then any number on B will do for the second wheel, and its opposite on A will do for the third wheel ; let us select the 60 on B for the second, and the 30 on A for the third, and our compound train will read thus—mandril wheel, 20 ; second wheel, 60 ; third wheel, 30 ; screw wheel, 120.

Now try an example of a very coarse screw, say one having one thread in 3½ in.

The leading screw has 7 threads in 3½ in, and the required screw has 1, therefore set 1 on B to 7 on A ; then any number on A will do for the mandril and its opposite on B will do for the leading screw, single train ; thus on A we have 70, 105, 140, 175, 210, 280, against 10, 15, 20, 25, 30, 40, on B; let us take the 40 on B for the leading screw, and its opposite 280 on A for the mandril, but there is no 280 in our set of wheels, and we therefore reject it, and adopt instead of it some other large one that we have, say the 140; set the rejected (280) on B to the adopted (140) on A, then any number on B will do for the third wheel and its opposite on A for the second wheel; take the 100 for the third and the 50 for the second, and the train reads thus—mandril wheel, 140; second wheel, 50; third wheel, 100; leading screw wheel, 40

It will be observed that in this case the second and third are taken from lines A and B respectively, because the required screw is coarser than the leading screw, the contrary of this being the case with the first example.

I have myself arranged a great many formulæ for my own convenience, for the solution of problems in mechanical science and practical mechanics, which I find to be of the greatest assistance to me in my daily avocations as a mechanical engineer; and in the solution of some of them I assure you there is nothing I know of so like magic as the action of this wonderful instrument, a movement or two of the slide often solving a complicated question in an instant, in which, perhaps, five or six elements are given involving operations in square or cube root, areas of circles, proportions of levers, pressure of steam, and other complications.

Hoping I have not trespassed on your space too much, I am, &c.,
Brooklyn, N. Y., Jan. 20, 1882. B. J. Z.

Editor of the BUILDER AND WOOD-WORKER:

Enclosed you will find drawings of Steel Square Problems, showing the operation of finding the sections or backing of high rafters, over a right obtuse and acute angled plan, where the angles or pitch of the roof is of different degrees or elevation.

Let A, B, C, D, Plate 24, be the plan of the roof, P F the elevation, and E F the pitch of the roof on the sides A C and B D; draw E G and C X the pitch on the sides A B and C D. Draw the plan and find the lengths of the hip rafters A J, B K, and C L as shown.

To find the angles to bevel the hip B K, draw the line N D, Fig 1, indefinitely, place the square on the line, with P F on the tongue and M B on the blade; then place the square on the opposite side, with H G on the tongue and E P on the blade, then the tongue of the square gives the angles required.

To find the angles to bevel the hip A J; place the square on the line S R, Fig. 2, with A T on the tongue and A P on the blade; then place the square on the opposite side with A E on the tongue and A P on the blade, then the tongues of the square gives the angles required

To find the angles to bevel hip C L, bisect C X and R X, place the square on the line Y V, Fig. 3, with X 2 on the tongue and E P on the blade (for the side C A on the plan), then place the square on the opposite side of the line with C 3 on the tongue and C R on the blade, then the tongue gives the angles required.

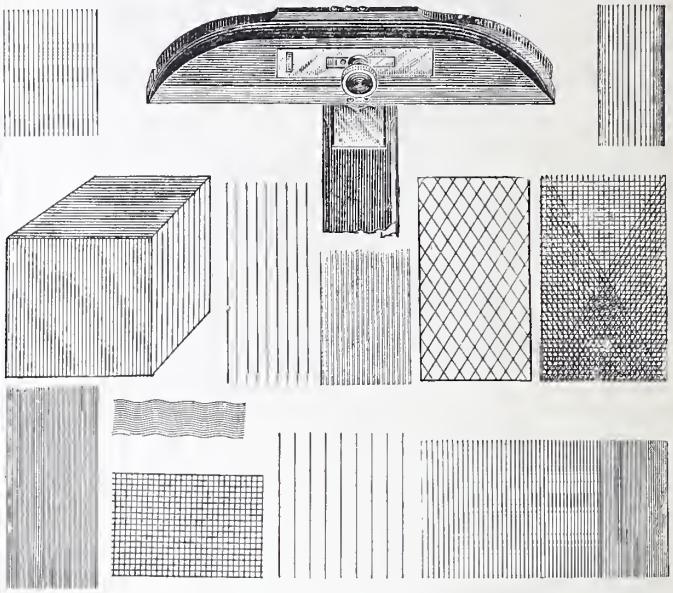
L. D. GOULD.

The Wood-Working Industry.

THE following figures compiled from the U. S. census returns of 1880 may prove interesting to those engaged in any branch of the wood working industry : There are in the United States more than 65,000 establishments employing 400,000 persons, and using material of the value of over 350 millions of dollars yearly in the manufacture of articles from wood alone. Besides these there are over eight million workmen employed on articles constructed partially from wood, and using that material to the value of $6,000,000 yearly. For a series of years there has been throughout the Northern States, a reckless, criminal and suicidal destruction of timber, which will in the not remote future entail disaster upon the wood-working industry and upon the country at large. No more important measure could occupy the attention of Congress than the enactment of prevention measures against the wholesale robberies of our forests. The sale of that portion of the public domain covered with timber ought to be accompanied by stringent restrictions against unnecessary waste. A reasonable care for the future should occupy the attention of the present generation.

A New T Square.

THE accompanying cuts represent the head with a section of the blade of the square, and several specimens of ruling and shading, photo-engraved direct from work done by aid of the square with a common draughting pen, the lines being separated at perfect intervals and as rapidly as those made free hand. The space between lines may be varied, by turning the thumb screw from zero to seven-eighths of an inch and made horizontally or upon any desired angle. Blades are made of any desired length or material. The squares are sold at prices varying, according to finish, length and quality of blade, etc., from $6 to $8 which sum, when the quality of the material and fine workmanship in the square are taken in o consideration, is not at all exorbitant.



We have worked with one of these squares and can testify to their being all that is claimed for them. They are easy to operate, perfect in their action, and when once understood, give the most satisfactory results.

There is an attachment, separate from the square, that may be obtained from the makers, by which wavy lines can be formed, such as may be seen in one of the cuts.

For further particulars, address D. T. Ames, 205 Broadway, N. Y.

Management of Workmen.

BY. S. W. GOODYEAR.

(*From American Machinist.*)

HOW can it be possible to lay down any rigid rules by which the proprietor, superintendent or foreman shall be governed in his treatment and management of either journeymen or apprentices ? With the fact before us that men differ so much in their capacity to learn, and in their temperaments and dispositions, coupled with the influence which family relations, or social surroundings may have upon men, often transforming the naturally careless man into one of the most painstaking of workmen, or on the other hand changing the best of workmen to the worst of "slouches," is it not rather the fact that the secret of successful management lies not in the direction of that impartial treatment which is so often recommended, but in closely observing the differences in men, and treating them accordingly ? It seems to be the opinion of some that the reason why certain foremen get so large a proportion of bad work from the men of whom they have charge, is because they do not often enough accord full praise for the good work which is done. Upon inspecting the job which the apprentice or journeyman has thought to be good enough, some foremen invariably have fault to find, or if not actually finding fault, they accept the work saying : "It will have to go I suppose." It may be very unpleasant to the really good workman, who knows what good work is, and takes pride in doing it, to work for a man who never appears to appreciate his endeavors. If, however, he is a true mechanic, this will not deter him from doing good work. His self-respect and actual love of nice mechanical operations will keep him in the right track. Neither praise nor flattery are needed to get good work from such a man. On the other hand it is a fact that there are many mechanics who never do a job quite as well as it might or should be done, and to praise, or accept whose work as passable even, without cautioning them to do better next time, would be to them not an incentive to do better work in the future, but an encouragement to follow their natural inclination to see how poor a job they can make pass. There are men who must

be handled as carefully as you would handle eggs, men with much spirit, extremely sensitive, on the watch continually for fear they will be either ill treated or slighted. These are, nevertheless, in some cases, the best of workmen.

There are men who can be changed from one kind of work to another twenty times a day, ready to break off smilingling in the midst of a job, never annoyed and always doing good work. Such a man is a prize, but no more so than the man who will scowl, and even growl or quit if you insist upon changing him about from one job to another. The latter individual is so constituted that when he commences a job he fully charges his mind with all the details from beginning to end, and to take him off until it is completed, disturbs him beyond his power of endurance. There are men who need driving up to get a fair day's work from them, and others who need holding back to prevent their work being slighted in their endeavors to do too much. Men and boys there are who have bright cheerful homes, whose lives outside the shop are kept pure through the influence of right-minded fathers and mothers, brothers and sisters, or wives and children; while others—away from relatives and friends, make a boarding house simply a place in which to eat and sleep, not a home, their leisure hours spent in amusements, or indulgences.

Many of the hours which should be devoted to sleep even, are spent by them in a manner which impairs both mental and physical abilities. There are those who are quick to comprehend, either by drawings or instructions, all the requirements of a job of work, and still others, who at a glance think they see the whole, and to any explanation are ready to say, "yes," "of course," "that's plain enough," but still go on and make a "mess" of the whole job. Ultimately it is found that these individuals not only knew nothing about what they said so glibly, "yes, I understand," but that they have not the capacity to learn. Next come those of apparently dull comprehension, of whom there are some who can tell you truly they "don't see through it," and others who, not quick to see, will, if time be given them to investigate, never stop short of the most thorough understanding of the minutest details. Again, there are men who are so awkward as to be kept for months or years from attempting even to do anything requiring skill and dexterity, but who, becoming piqued at the implied lack of confidence in their ability, determine to not only do, but to *excel in doing*, at the first opportunity, that which had been supposed to be impossible for them to learn to do even tolerably, and who succeed in their resolution. There are men of great natural ability as inventors, to snub whom, and to ignore whose many suggestions is, to render them almost useless in the shop. On the other hand, there exists a class who continually suggest improvements in machinery and processes, whose plans it will never do to adopt. If those who talk so glibly about how to manage help, and how easy it is to always turn out good work, often saying that "it is just as easy and takes no longer to do work just right," would consider that the superintendent or foreman who gets the blame when bad work passes through his hands is many times obliged to get along with men who, not only do not understand, but have not the ability to learn what is right, they would change their minds about the easy duties of those who have charge of help.

Lincrusta-Walton.

UNDER this name a new material for wall covering, decorated panels, embossed work, etc., is now being introduced into the American market by a responsible English firm. This material, under the name of Muralis, has been in use in England to some extent for several years past, and seems to have been recieved with considerable favor by architects and decorators. It is composed principally of solidified linseed oil, made by exposing the raw oil to heat with a small portion of metallic oxide of lead added. This makes a viscid varnish, which, when mixed with woody fiber, is rolled on to a fabric. On this material ornamentation in relief is obtained by machinery. It is flexible, tough, and waterproof, and can be scrubbed with soap and water. In a recent issue of the *Tincture Pratique* the printing of colors at the same time the machine produces the relief of Lincrusta-Walton is described. The basis of the composition is given as follows: Oxidized oil, 800 parts; gum kauri, 100 parts; resin, 245 parts. To 800 parts of this mixture are added 100 parts of ochre, 62½ parts of red lead, 50 parts of parafine wax, and 100 parts of oil of turpentine.

According to some excellent authorities the new material possesses some very good qualities, amongst them being its impermeability to moisture, beauty of design, boldness of relief, and clearness of outline. It is also a non-conductor of heat, and does not expand and contract when exposed to alteration in temperature. It may be washed with soap and water without injury, and is, therefore, highly sanitary.

It is claimed by the manufacturers that a piece of the material fixed for the last eighteen months on an outside wall, facing the southwest, and exposed to all the violence of the storms and frosts of last winter, as well as to the heats of summer, has been found not to suffer the slightest deterioration; it is, therefore, applicable to cover *external* walls, thus adding to their beauty whilst protecting them from damp.

Doubtless, when the true value and beauty of this material become known in this country, it will become as popular here as in England.

New Publications.

We deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

The Open Fireplace in All Ages.—By J. Pickering Putman, architect. Written originally for the *American Architect and Building News*. Illustrated by 300 cuts, including 55 full-page plates. New edition, revised and enlarged, containing over twenty new plates of designs of chimney-pieces and interior decoration, contributed by American architects. James R. Osgood & Company, Boston, Mass. Price $4.50

This is a book written on a subject that is but little studied by those who should be thoroughly conversant with the principles it discusses.

Designers and draughtsmen, whose duty it is to make the fireplace beautiful as well as useful, may draw an infinite amount of inspiration from the numerous illustrations exhibited. But excellent as the book will prove to the designer, it will not be to him so useful as it will be to the practical architect and builder; and as no part of a structure is so little understood as the fireplace and chimney by this class, the book will supply them with a want that they must have long felt, as it contains rules and tables, the results of actual experiments, concerning the different shapes and forms of fireplaces, that are suggestive and instructive, and that cannot be found elsewhere. There are 55 full-page illustrations of examples of fireplaces from all countries, and from mediæval times down to the present, showing the various styles, changes, and progress that have occurred during the advancement of civilization and science. No house nowadays of any pretensions is built in this country that does not have one or more fireplaces in it; and this is as it should be, for after all there is nothing more cheerful about the appointments of a home than a bright fireside. It may be true that an open fireplace may entail a great waste of fuel while kept in active service, but this expenditure is more than compensated for by the extra amount of health, comfort and sociability that the glowing embers are sure to foster. The book, though not exhaustive on the subject, is brimfull of hints, and is equally useful to the householder and the house builder. Another very useful addition, and one that will be appreciated by the professional reader, is a detailed description of some of our best ventilating fireplaces and heating apparatii. There is also added, in the appendix, a table of the metric system, of money, length, weights, capacity, and square and cubic measures, with a scale for their conversion into inches, or of inches into metric measures of length. We heartily commend it to our readers as a carefully written and conscientious work, and full of such matter as cannot fail to be of use to every person connected with the building trades.

Lectures in a Workshop—By T. P. Pemberton. With an Appendix containing the famous papers by Whitworth, "On Plane Metallic Surfaces, or True Planes"; "On an Uniform System of Screw Threads"; "Address to the Institution of Mechanical Engineers, Glasgow"; "On Standard Decimal Measures of Length." The Industrial Publication Co., New York Price, $1.00.

The object of this little work seems to be to stimulate young men and workmen to prepare themselves by self culture and study to become fit to fill the higher positions open to them, and to show them in plain language how attainments may be acquired by which all workmen may lift themselves to higher planes. The whole "course" is somewhat philosophical and impressive. The workman who reads this little book will certainly be a wiser, and let us hope, a better man from the effort.

Sewer Gas and its Dangers, with Position of Common Defects in House Drainage, and Practical Information Relating to their Remedy. By George Preston Brown. Jansen, McClurg & Co., Chicago, Ill. Price, $1.25.

This little work does not aim to be considered a scientific one. It discusses the subject in hand in a plain, practical common-sense way, and the hints, suggestions and actual information given are based on the result of experience, and their usefulness is so apparent as to commend them to the good sense of every householder who reads them. The writer gives an account of a number of actual fatal cases, where diptheria had been traced to the poisonous effects of sewer gas; in Chicago several methods are offered by which defects and leakages in drains, soil-pipes and connections may be discovered and avoided or remedied. The work contains a number of appropriate illustrations, and the printing, binding and paper reflect credit on the publishers.

Terra-Cotta in Architecture.—Being portions of a paper read before the Leeds Architectural Association by Mr. James Holroyd.

A. Williams & Co., 283 Washington street Boston, Mass. Price 15 cents.

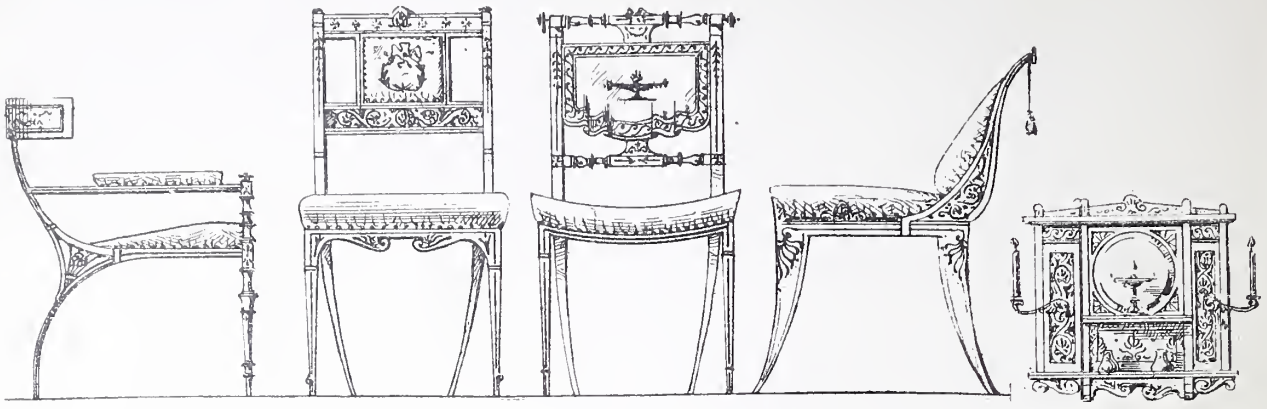
This little work contains some very valuable information regarding the manufacture and qualities of terra-cotta, such as will be of service to any one who is interested in the material, or who may contemplate using it. Two full page plates of illustrated examples in terra-cotta, the originals of which are manufactured by Lewis & Lane, of Boston, are shown in tint. These are fine specimens of the Albertype process of printing.

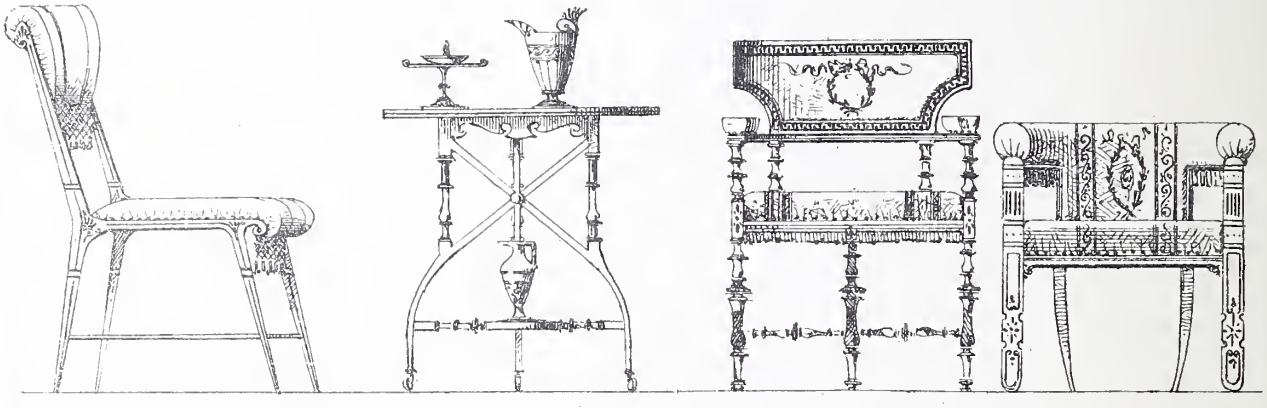
Modern House Painting, containing twenty colored lithographic plates, exhibiting the use of color in exterior and interior house painting, and embracing examples of simple and elaborate work in plain, graded and parti-colors; also, the treatment of old styles of houses, together with full descriptive letter-press, covering the preparation, use and application of colors, with special directions applicable to each example, the whole work offering valuable hints and suggestions on harmonious color treatment, suitable to every variety of building. By E. K. Rossiter, Arch. B., and F. A. Wright, Arch. B. (late instructor in Architecture, Cornell University). William T. Comstock, Publisher, 6 Astor place, New York. Price $5.

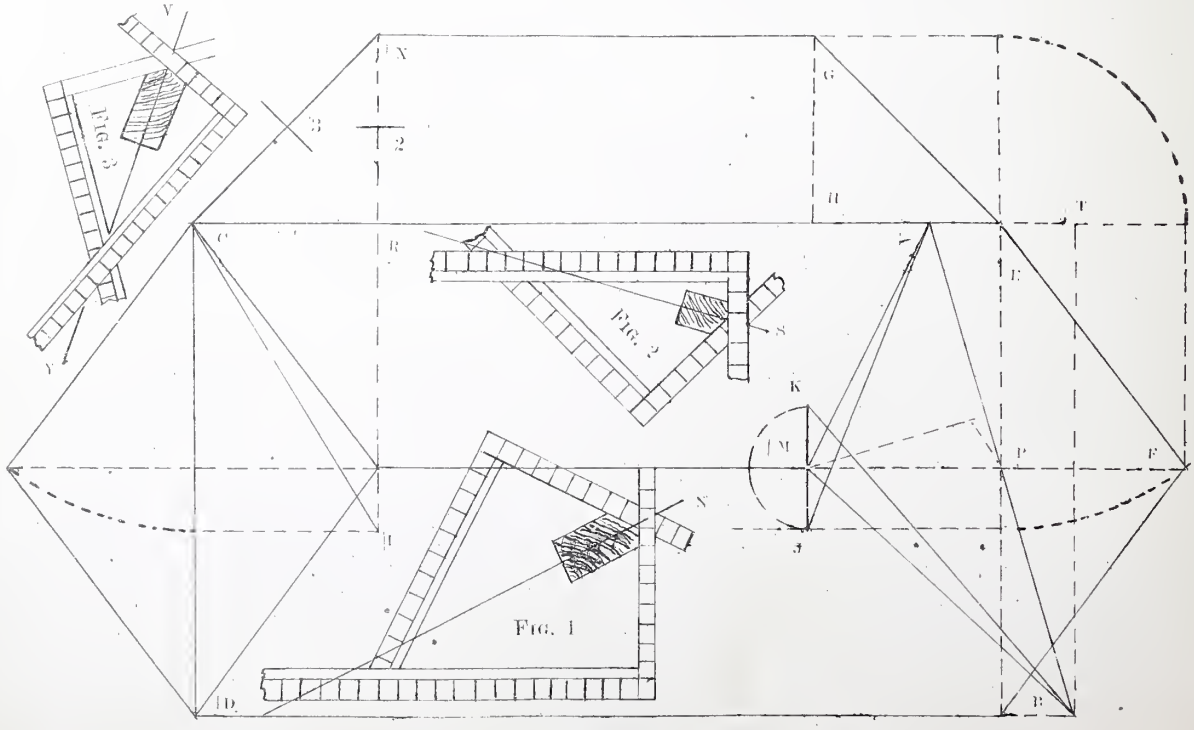
We have been favored with several advanced sheets of this work, and are satisfied that it will meet a want that has been felt by nearly every one that has had anything to do with building. Elevations of buildings are shown, with the coloring exhibited just as the house should appear when finished. Examples of interior work are also shown. To decide on colors for interior work is often a difficult task, and it is with a view of aiding the decorator to arrive at an intelligent decision in this matter that these examples have been prepared. We may have more to say on this publication in a future issue.

PLATE Nº 24

Greek as applied to Drawing Room Furniture. By W. Timms.







STEEL SQUARE PROBLEMS. By Lucius D. Gould.

Interiors and Interior Details, covering fifty-two large quarto plates, comprising a large number of original designs of halls, staircases, parlors, libraries, dining rooms, etc., etc., together with special designs for low cost, medium and elaborate wood mantels, sideboards, furniture, wood ceilings, doors, door and window trims, wainscots, bank, office and store fittings, in perspective, elevation and detail; making a valuable series of suggestions for architects and architectural designers; and a large collection of interior details suited to the requirements of carpenters, builders and mechanics, reproduced from the drawings of prominent architects of New York, Boston, Chicago, and other cities, with an introduction, description of plates, and notes on wood finish, by Wm. B. Tuthill, A.M., architect. William T. Comstock, 6 Astor Place, New York. Price $7.50.

As the title indicates, this work is devoted exclusively to interior work, and is more valuable on that account than if it covered more ground. As a recommendation of the work to our readers, we have but to say that a large number of the drawings for it have been prepared by Messrs. Gerald & Angell, architects, of Providence, R. I.; Edward Dewson, art designer, Boston, Mass.; and A. M. Wheeler, of New York. We predict for this work a large sale among builders where architectural aid is difficult to obtain, and, indeed, architects in the outlying cities and towns will find many things in this new aspirant for their favor, that will be useful and suggestive, as the examples are abreast of the times, and in keeping with popular styles.

Chats with Correspondents.

[Any of our readers will be welcome to take part in this Department.]

Inquirer of New Brunswick forgot to send his name and correct address. We may say to him, however, that we cannot undertake to perform impossibilities. To build a house and barn, with cellar to each, and all modern conveniences in the house for a sum not exceeding $1,000, is more than we are equal to, even if we desired. As we stated last month, we are not prepared to furnish plans, elevations, details and estimates for each of our subscribers, or for any one who may want such, at the rate of fifteen cents for the whole lot. To get plans, elevations, or such as you ask for, and publish them in the BUILDER AND WOOD-WORKER, would cost the publisher something like three hundred dollars. This expenditure, you will see at once, is inadmissible. Get an idea of what you want from some of the designs we have published, then go to an architect and tell him what you want, pay him for his services. This is business, and it is the only way that will prove satisfactory all round.

W. H. C., Rougement, Quebec.—Send along your "Barn Plans." If they are as fine as you say we will be pleased to reproduce them. At present we do not think of publishing the BUILDER AND WOOD-WORKER weekly, though a goodly number of our subscribers wish us to do so. We are satisfied that we give as much each month, in the shape of reading matter and illustrations, as the majority of our readers can very well find time to thoroughly study. Thanks for your good opinion of us.

J. B. Ayle, in a letter, which for want of space, we cannot publish, says with regard to foundations for country wooden houses, "that thousands of otherwise handsome houses are twisted out of shape because of insufficient brick or stone foundations. It is the usual practice in the country when laying in a foundation for a wooden house to pay no attention to the footings, or even to level up the walls properly. As a rule the tops of the walls are left concave, and the carpenter is forced to level his sills with blocks, and thereby leaves a space between the bedding mortar and the under side of the sill. It is not at all creditable to any mason to have a foundation wall settle under a wooden building two or three stories high.

R. N. T., Buffalo, N. Y.—We cannot say, not being acquainted with the conditions, what colors or materials would best suit the room you speak of. You say you wish it furnished as *æsthetically* as possible, regardless of expense. Well, make the ceiling and cornices a golden bronze, the latter to be picked out with green and silver bronze; repeat throughout the woodwork, which will have the general appearance of Japanese aventurine lacquer. Use a dark-hued tapestry paper with metallic diaper pattern which serves as an effective background for choice little paintings on the walls, and a fine iridescent Moorish plate suspended above one of the doors. A quaint hammered metal lamp with heavy silk cord and tassels of pomegranate red should hang from the ceiling, giving picturesque effect. Excepting some odd chairs, curiously carved and luxuriously upholstered, the furniture should be of ebonized cherry with brass fittings. A dull brown, heavy Axminster carpet will show to advantage, with two or three Turkish rugs, excellent in color. The general somberness of the walls and furniture should act as a foil to the rich coloring of the drapery, which should be chiefly plush of robin's-egg blue. This, with old gold plush, should make a curtain for the fireplace, over which is a piece of rare Chinese embroidery—a many-hued floral design upon a brilliant yellow ground. Above place a trophy of arms. The doors should be concealed by portieres of choice embroidered stuffs with colors mellowed by age.

If this is not æsthetic enough, place a few dried sunflowers in the corners of the picture frames, and pin a few dead butterflies, with out-spread wings, on to the curtains; mellow the light by using cathedral stained glass in your windows.

T. V., Springfield, Mass.—You should wet the paper with a brush and clean water as large a portion as you can conviently color at one time, then blot the water off with blotting paper as you proceed with the color, leaving the drawing paper a little damp. This process will remove a little of the superfluous ink, and enable the color to lay much more evenly, and at the same time prevent the ink from running with the color. Of course, this relates to where the drawing has been inked in before the color goes on. It is always best to color the drawings before they are inked in. On tracing cloth put the color on the back of the drawing.

T. R., Toledo.—One plan for fixing slips, though but little adopted, is by means of a block of wood into which some half dozen are sunk and fixed side by side. This is handy, no doubt, but each slip can, of course, be used on one side only. A better way is to press the slip in a vice between two pieces of deal or other soft wood. The only and the great drawback to this practice is the shape of the ordinary slip, from which in this era of great and rapid commercial changes we may hope some day to be delivered. Shaped one way and sometimes two ways, like a wedge, what a triumph of genius it is, seeing that one is capable of sharpening tools of two different sweeps! One day it may occur to some one that it would be better still if they were made available for four different sweeps—a result to be obtained by simply dropping the wedge form altogether and making the slips say about two inches square. Made in this way, they might be fixed in the vice as described with little danger of breaking except in the case of thin slips, and these there would be no need to fix in that way. It is quite sufficient to hold them in the hand.

There are few, if any, tools more troublesome to sharpen from the inside than a parting tool. Every one will desire a fast cutting slip for this purpose, and great care is required in its selection. The difficulty lies in obtaining one which, while it is fast cutting, is not at the same time brittle, so that it cannot be used without the thin edge breaking away. Before leaving the subject of stones, it may be well to point out the value of paraffin oil for cleaning them; indeed, those who do not object to the unpleasant smell will find it most suitable for general use in sharpening. Every one knows how dirty an oilstone will become from frequent use, and if for no other reason it is objectionable for this—viz., that the pores of the stone are clogged and its cutting powers impaired. By the use of the oil just named this clogging is reduced to a minimum. Next to this is perhaps neat's-foot oil. One of the worst is that ordinarily sold for this purpose at the oil shops.

Before attempting a task of any kind it is considered wise and necessary that a tolerably clear conception should be formed of the end or object to be attained—the clearer the better. The runner, if possible, fixes his eye upon the goal and makes straight for it. For the intelligent, and therefore proper, sharpening of tools this apprehension of the object to be attained is, as already observed, indispensable; what, then, are the points to be attained in sharpening a tool? First, of course, keenness, with a due regard to the necessary strength, without which keenness is of little value. And here we come upon one of the chief difficulties of the carver in relation to this matter—viz., to preserve a desirable keenness without unduly adding to the strength or thickness of the edge. The whole of the surface of the tool which is affected by sharpening may, of course, be gone over each time the tool is sharpened, and the desired keenness and thickness of edge is preserved; but the busy workman is only to glad to escape the trouble involved in doing this, not to mention those who look only at the irksomeness of it. Let the carver, then, grind at the back and rub from the inside, so that the tool is made thin for some little distance from the edge, then bring to an edge at another angle, which shall have the effect of making a thin, but at the same time strong, edge.

M. E. G., Charlotte, Mich.—What you say regarding the "Wood-Carving Manual" is true, the text is good and to the point, but the illustrations might be much better, and certainly more appropriate. We have tried on several occasions to procure drawings of some of the carved work done in Cincinnati, but so far have been unable to get them. We have some photographs of carved furniture that was designed and executed by a lady in Cincinnati, but we cannot make reproductions from them by our process. Thanks for your good opinion of us. Cherry wood will retain its color and natural beauty if it is oiled with a light coat of raw linseed oil, then rubbed with a cloth until the wood appears dry. Give one light coat of white shellac varnish thinned down with alcohol; when dry and hard rub down with powdered pumice stone, or with rotten stone powder to take off whatever gloss the shellac varnish may have caused. Oak may be treated the same way; but it is better to fill it with some of the prepared wood-fillers now in the market, then varnished as the cherry, and the gloss rubbed off. Fresco your plastered walls in distemper by all means. Oil work will not serve your purpose, unless the walls have first been prepared. At any rate, oil work would not look so well as work done in distemper. The *Journal of Decorative Art*, published in England, is perhaps the best periodical published on this subject. We can supply the paper regularly. We will be pleased to have you "come again" and often.

Publisher's Notes.

SPECIAL NOTICES.

☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

FOR CLUBBING RATES, see November number, page X.

ANY one having a complete set of "Knight's Mechanical Dictionary" for sale cheap, may find a purchaser at this office.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881 are ready for delivery. Price, when sent by mail, prepaid, $2.50. When sold at the office, $2.25. This volume contains 96 full page plates of designs.

OWING to a large increase of business, Goodell & Waters, of Philadelphia, manufacturers of wood-working machinery, have been obliged to enlarge their workshops very considerably.

TWENTY-FIVE cents, in money or stamps, sent to this office, will insure you a full-sized drawing and details of an "umbrella stand," and a half-sized drawing, with all details, of a cheap "Queen Anne" washstand, sent postpaid.

WE wish it distinctly understood that we do not send books, papers, instruments, or tools, from or through this office without the cash accompanies the order for the goods. "On approval, C. O. D.," or, "Send and I'll remit," will not do us hereafter. We must have the money before we send the goods!

A. J. Bicknell, of 194 Broadway, and late of Bicknell & Comstock, has just completed the organization of a company to be called "The Builders' and Manufacturers' Mutual Benefit Association of America." The object of the association is to furnish a benefit of one to six thousand dollars at about actual cost.

W. F. & John Barnes, of Rockford, Ill., manufacturers of every kind of foot and steam power machinery for wood and iron, are nearly overpowered with orders. They now employ 65 men regularly, and their pay roll sums up the handsome figure of $35,000 per year. They use up in the manufacture of their machines over 75 tons of coal and 300 tons of iron. Their shops are driven by water.

FOR two three-cent stamps we will send "Hints on Estimating," a thirty-two page pamphlet, containing rules for estimating on the cost of wood, stone and brick work, painting, tinning, glazing, plastering, and general finish about a house It gives prices of work and materials, including hardware, paints, glass, etc. The best little book of the kind ever published. We send it prepaid for six cents, or two three-cent stamps.

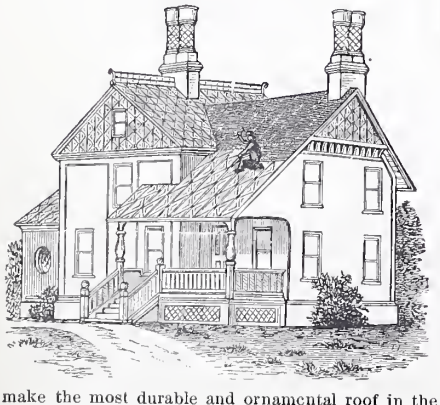
PRACTICAL LESSONS IN ARCHITECTURAL DRAWING: or, How to Make the Working Drawings for Buildings (an entirely new and original work). Illustrated by 32 full-page plates and 24 woodcuts, showing methods of construction and representation. The work embraces Scale Drawings of Plans, Elevations, Sections and Details of Frame, Brick and Stone buildings, with full descriptions and a form of specification adapted to the same. Suited to the wants of architectural students, carpenters, builders, and all desirous of acquiring a thorough knowledge of architectural drawing and construction. By Wm. B. Tuthill, A. M., architect. One large 8vo volume, oblong, cloth. Price, postpaid, $2.50. This work is having a very large sale, and is appreciated by every one that secures a copy.

SEND seventy-five cents to this office for a copy of the "Steel Square and its uses." The best Book for young workmen in the market.

ADVERTISER'S INDEX.

CLASSIFIED.

METALLIC SHINGLES



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PUBLISHED MONTHLY,

AT

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PRICE. ONE DOLLAR AND FIFTY CENTS A YEAR.

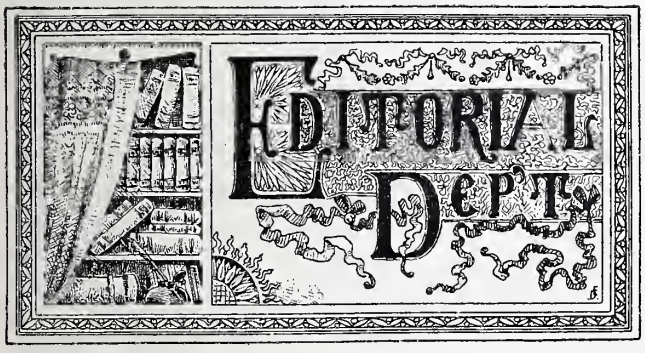
CHARLES D. LAKEY, PUBLISHER. FRED. T. HODGSON, EDITOR.

Newsdealers will please order through *The various News Companies.*

Subscriptions to Great Britain and the Continent of Europe, $2.00; Australia, $2.50; China, Japan, Sandwich Islands, Mexico, and Cuba, $3.50; South America, $4,50.

N. B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } APRIL, 1882. { WHOLE NUMBER, 175 / NEW NUMBER, 4



WE wish to inform our brothers of the press that the column headings in this issue of THE BUILDER AND WOOD-WORKER, and which will appear in all future issues of this paper, are the designs and work of an American artist, and they are original, too. If you think these headings add to the artistic appearance of the paper, say so; if you think they don't, why don't be afraid to mention the fact. Of one thing we are certain, and that is, that our readers will fully appreciate the appropriateness of the headings, and will, no doubt, find many things about them to admire.

WE have frequently reminded our readers of the fact that the days of soft wood finishings and trimmings in the better class of dwellings, public halls, stores, places of worship, and offices, are passed. The joiner must learn to manipulate hard woods, or the cabinet-maker will take his place. Workmen in New York, Philadelphia, Boston, Baltimore and Chicago, are now becoming experts in hard wood work, and soon the fashion of having hard wood finish will penetrate into every city, town and village in the country.

IN the use of hard woods, these that are dark seem to be most in demand, rosewood taking the first place, and mahogany, cherry, and black walnut in the order as written. Oak, ash, maple and black birch make very handsome finish, and are used somewhat extensively in finishing upper stories, basements and back offices. Rosewood for full finishing is expensive and very elegant. Mahogany is being used quite freely, and cherry is much sought by some. Although black walnut is in great demand it is not called for by those seeking the highest beauty. Other kinds of woods, besides those mentioned, are sometimes used, such as satinwood, amaranth, cocobola, ebony and white holly. There is also considerable inquiry for sweet gum. There are indications, according to prominent builders, that this wood will come into use, when it is properly prepared and seasoned.

THE young workman who desires to become more than a mere machine, must not be afraid of labor. The suspension of the usual daily work at the bench, lathe or saw, should be the beginning of an intellectual labor that will aid him to lift himself to a higher plane in due time. Of course, we do not think it wise for a young man to tie himself down to study every night, or to toil unremittingly every day. The brain and brawn must have rest, and it is quite as essential that the mind should receive a tonic in the shape of fun and amusement as it is that the body should be sustained, nourished and invigorated; but amusements have their time and place, and should not be permitted to interrupt the studies of the aspiring mechanic. Remember, the only roads to promotion are steadiness, judgment and intellectual advancement. The true rule for a young man is to make himself as useful as possible to his employer. He should never feel satisfied with himself as long as anything in his power to promote his employer's interest is left undone. Success is sure, sooner or later, to crown the efforts of everyone who earnestly strives to deserve it, but it is never found by those who rest and play when the eye of authority is turned from them. There is no "royal road to success" in any of the matters of life, and this axiom is doubly true when applied to the mechanical arts. He who succeeds the best is he who is unremitting in his labors. A man who regards work as a hardship, an oppression, can never do anything well. He must take an interest in his work if he would excel.

FOR keenness, natural shrewdness and indomitable energy, the American workman has no equal, but his restless and roaming peculiarities, and his proneness to drift into politics, are, in many instances, drawbacks to advancement in the mechanical arts. Though a persistent reader of newspapers and periodical literature, he seldom makes the acquaintance of the greater literary lights; this is to be deplored very much, but there are hopeful signs, for occasionally we run across a mechanic who can criticize the works of Dickens, point out the best passages in the productions of Byron, and quote Shakespeare to your heart's content. His knowledge of his country's history, back to the earliest records, is almost perfect; and as to figures and knotty scientific and geometrical problems, their study to him is an easy and pleasant task. Such a man is bound to rise far above those of his fellow-workmen who prefer to idle away their time in the pursuit of some useless hobby, or in the pernicious company of that pest of society, the bar-room politician. The pen may be a mighty influence for good, and many of its productions, when they find their way into the hands of our working men, are duly appreciated, properly valued and well studied. What is wanted in every town in America is a well-stocked library full of useful books; so that the working men living near can go and read on the prem-

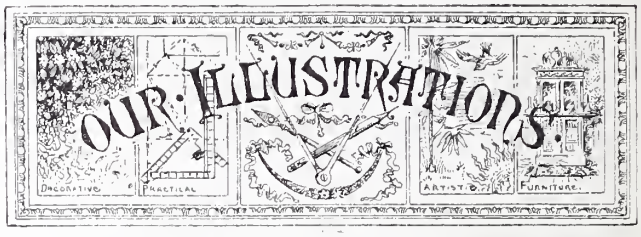
ises, or take home from thence some substantial volume, from which they may glean many a useful hint and many a sound piece of advice. Let the volumes be judiciously selected, so as to embrace science, history, biography and the fruits of many such writers of fiction as Scott, Lytton, Thackeray, Cooper, Dickens and the poets. The perusal of their works alone cannot but lead to a desire for further knowledge, and thus the readers will be led to study productions of even a more solid and useful character. A man should have some knowledge of the history of his own country; he should be made acquainted with its customs, both past and present; he should be familiar with its poets, authors, statesmen and theologians; and any steps taken to accomplish this object are steps in the right direction.

If we cannot have free libraries, let the books be lent out upon payment of a nominal sum, and by this means the institutions would almost, or entirely, support themselves. There are many large employers of labor in our cities and towns, who, if they only gave the subject a little attention, would see the immense advantage of establishing such useful institutions in their shops and warehouses, whereby many in their employ might be enticed from degrading practices, and be led to intellectual pursuits, which would ultimately benefit themselves and their country.

NEW YORK and other rapidly growing cities on the American Continent don't appear to be much worse off in point of "scamp building" than some of the growing cities of Europe, if we are to believe what an eminent architect of London says of some of the buildings there. In reading Mr. Street's speech, recently delivered before his professional brethren in London, we are reminded that what he says as taking place there is an everyday occurrence in this country, and will, in spite of all remonstrance, very likely continue for some time. People put up buildings of a kind only intended for present needs, too small for the wants of the near future, and so frail and unsubstantial that they seem to be only intended for temporary use. When these buildings become unfit for the needs of the occupants, or out of character with the locality in which they are situated, instead of being pulled down and rebuilt, they are pieced out or raised in height, and a still more unstaple class of buildings is the result. A dwelling-house, for example, has been put up on a street destined to become a commercial thoroughfare, and in the certain course of things is soon out of place, and the land is required for business purposes. To meet this requirement a wonderful transformation takes place, converting the modest dwelling into a gaudy shop. This mixture of old walls and new, old floors and new, of course soon displays cracks in the plastering and other evidences of its shaky condition, but these are carefully filled up and painted over, and the building is made to do service until it arrives at a tottering old age.

Not only are buildings put up without a thought of the certain wants of the future as regards accommodation and suitability to the developing character of the street or locality, but they are often built in so cheap and careless a manner as to be unfit for occupation from the first. These houses are constructed of the poorest class of materials, and the frail and unsafe construction is hurriedly covered out of sight, the study of the builder being how little he can do and still give his cheap work an attractive appearance. The unfortunate occupier of such a house knows the constant succession of trouble and annoyance which has to be endured.

The drainage and plumbing are found to be a system of pipes carelessly joined together, which allow part of the filth from the house to soak out into the earth, and the remainder to run into the sewer, and which ventilate the sewer into the house with all its deadly gases. The unending succession of expenses necessary to keep things in order, soon teaches him that a cheap house is the dearest possible investment. The doors and woodwork shrink and warp out of shape, windows rattle, draughts are felt all over the house, the plaster, walls and ceiling crack, the paint turns color within and washes off without, the flimsy glass is continually breaking, and leaking roofs, damp walls and numberless other troubles follow, until life becomes a burden.



WE think the illustrations shown in the present issue will please nearly every one of our readers, as we certainly have a variety. On Plates 25 and 26 we show three plans and five elevations of a snug cottage, suitable for almost any locality, but more particularly adapted for the seashore or the banks of a river or lake. This design is by Mr. Edward Dewson of Boston, Mass.

Plate 27 exhibits a design for a cabinet, which is intended to be executed in dark oak. The design is by E. G. W. Dietrich.

On Plate 28 we exhibit two interiors. They are reproductions from the *Cabinet Maker and Art Furnisher*. In a measure they speak for themselves. A good picture needs but little description, and the talent displayed in these plates will be at once apparent to the educated art furnisher. The designer calls No. 1 an "Interior of a Stuart Dining Room," and it certainly embodies the best features of the Stuart and Jacobean details.

The mantelpiece is particularly fine and individual in character. The sideboard is a capital study, more after Talbert's manner. The under part of dining table is excellent, and solves the problem of "elegance and strength combined." All the other detalils of this stately apartment show a thorough mastery of original matter on the part of the designer.

In the second design we get a "Side of Morning Room in modern Queen Anne;" not the sickly and nondescript rendering of the style all too prevalent, but some vigorous lines and proportions that would have delighted Kent or Gibbs a century and a half ago. We need not draw attention to the appropriate wall decorations, carried out in the same spirit as the cabinet work, or the clever pen-and-ink drawing which renders such work intelligible.

Plate 29 shows a neat parlor mantel, and is the work of Mr. Dewson.

Plate 30 is designed for amateurs, and is another of "THE BUILDER AND WOOD-WORKER'S HELPS TO AMATEURS SERIES." It contains two very handsome designs.

Plate 31 shows a number of preliminary pen-and ink sketches. These studies will prove both interesting and suggestive. We should like very much if other of our artists would send in sketches of this sort. We are indebted to Gould & Angell, architects, Providence, R. I., for this page.

Plate 32 shows a number of examples for roofs of different kinds.

Fig. A, is calculated for a small span of 20 to 25 feet; at one end of the collar beam is what is called the carpenter's boast, termed a dove-tail tenon.

Fig. B, is a truss for a roof, the purlins to be notched upon the principal rafters, calculated for an extent of from 30 to 35 feet.

Fig. C, is the simple construction of a roof for the segment finish of a dome, for an extent of from 30 to 35 feet.

Fig. D, is a roof for a span of from 50 to 60 feet.

Fig. E, is a roof supported by two queen-posts instead of a king-post, to give room for a passage. These roofs can be sufficiently understood from the diagram.

Fig. F, is a design of a roof for a theatre, which may extend from 80 to 90 feet. It frequently happens in building, that walls run across the roof; in such cases there will be little occasion for trussing the roof; the purlins may be trussed, which will save one or two pair of principals.

Fig. G, explains itself.

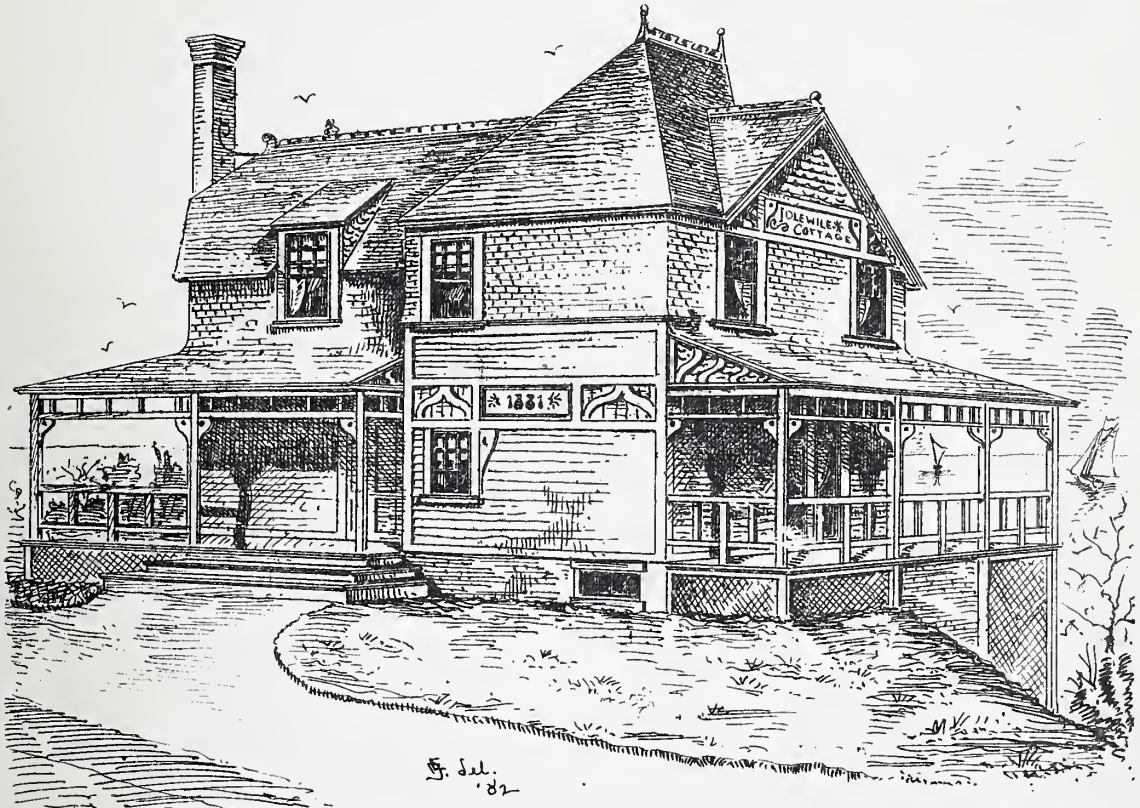
Fig. H, is a curb roof, with a door in the middle of the partition, the beam *a*, *b*, to run quite across the roof.

Fig. I, is a curb roof, with doors at the sides.

Fig. J, is a design for a church roof; span 80 feet.

Fig. K, is a design of the same kind, but may be applied to a greater extent.

PLATE No. 25



Perspective of

SEASHORE COTTAGE

AT NANTASKET BEACH

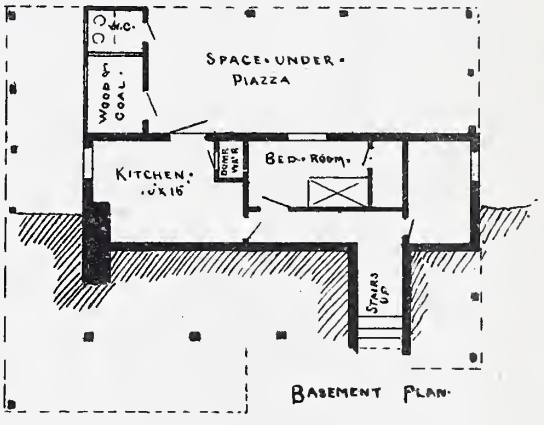
FOR ALFRED SCHOFF ESQ

EDWARD DEWSON

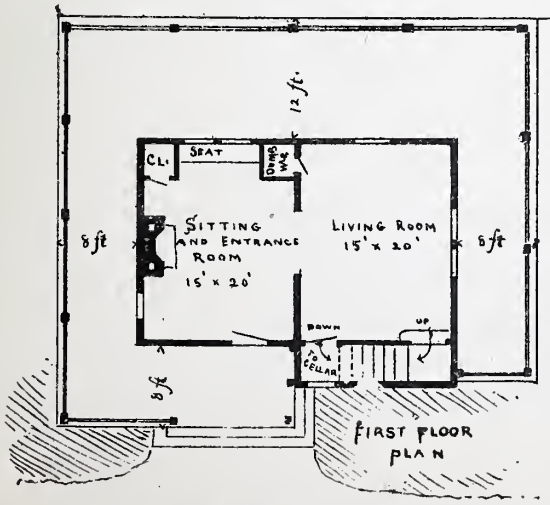
ARCHITECT

28 STATE ST.

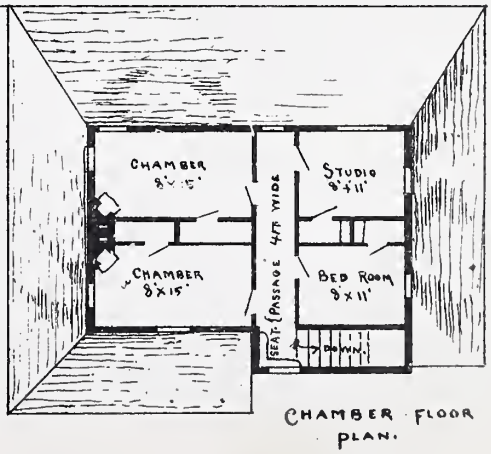
BOSTON. Room 25.



BASEMENT PLAN.



FIRST FLOOR PLAN



CHAMBER FLOOR PLAN.

Planers.

BY J. T. L.

A DANIELS' PLANER is something that is so indispensable in some kinds of business that it needs special mention. It is a tool that speaks for itself wherever it is used, but there are so many that think lightly of it, and hardly think it worthy a place even in the poorest part of the shop, that makes me come out with a few words in its favor.

In answer to a query in the early numbers of the BUILDER AND WOOD WORKER, I said, among other things, that what was wanted was a Daniels' planer in a mill using wood-working machinery. A little while after it a man largely interested in the building interest was in the mill where I was running a large Daniels' mill on some very nice house finish for himself. He admired the work, and said he never could see before what a Daniels mill was used for. And speaking of the article before referred to, said he thought a man was wild to put one of them into a planing mill. But no mill is complete which has not a *good* Daniels' planer in it. It will do an almost endless variety of work, and do it well (provided a man understands running it). It will run from ⅛ inch thick to as large as the mill will take, and do it *well*. It will joint, bevel, taper, plane, *perfectly* out of wind, and move perfectly to an even thickness, better than any other mill made, if rightly handled; but to a person that don't understand it, or appreciate it, its value is reduced very much.

A great many persons seem to think that if a man can trundle a wheelbarrow he can run a Daniels' mill; while in reality there is no mill made where a man can display his ingenuity more than on this mill, more especially in a place where there is a variety of work to do. In pattern, and all kinds of cabinet making work, there is no mill that can take its place, from the fact that if rightly handled and cared for it will make a perfect glue joint, and bevel perfectly to any bevel desired, and do a greater variety of work than any machine. What mill is there that will take from a timber fifty feet long and sixteen inches square down to a little piece two inches square if desired, and plane it perfectly to any shape desired, and do it well; or take a board on the same mill and plane it to a one-sixteenth of an inch thick, and do it well?

To do this and do it right, however, it is very necessary that great care should be taken in putting up the machine (or, I should say, in setting one down). A mill of this kind, especially a long mill, should be set down with the greatest care, and the foundations, especially under the machine part, should be solid and unyielding; free from any liability to be affected by freezing and thawing. No pains should be spared in making the whole thing solid and perfectly level and out of wind, for on this depends the good and easy working of the mill.

The top of the machine part should be fixed so that it can be solidly fastened with nice fitting wedges from both sides, so that if it needs canting the least bit it can be done by starting one wedge and driving the other. The feed gears should be kept perfectly tight, so the feed should be even and not jerky, which make bad, uneven work. There should be a clamp screwed up solid by a joint bolt on each end of the rack, so that the strain, in jigging back, should come on the clamp instead of on the bolts that hold the rack; this keeps the rack tight, and prevents its working loose and coming off. This applies especially to heavy machines for planing long timber, for sometimes we get the table pretty heavily loaded. I have never seen such an appliance as I speak of, but I think on a small machine in a cabinet or pattern makers' shop, a part of the bed fitted up like a cabinet maker's bench would be very convenient; indeed, it would make it so handy to do any quantity of little jobs, which if done in the usual way by doging, would take up much more time and not do it so well.

Great care should be taken to keep the head perfectly balanced, for a great deal depends on this as with every other quick running machine. It is no trick to balance it, for a few washers on one or the other of the studs will keep it in perfect balance, and a person can tell, by putting his hand on the frame, whether it runs true or not.

The care of cutters has a great deal to do with the good work done. If I was running soft wood all the time I would make the smoothing cutter almost perfectly flat, with the outside corner cut off so as to make a drawing cut, while the jack I would grind round like a gouge; but if I was having hard and soft wood mixed in together I should, by all means, run a round-nosed cutter, but grind the outside of the smoothing cutter off considerably, to make the drawing cut. A great deal depends also on the pitch, for no cutter will make good work if it scrapes; it must cut or poor work will be the result. A man who takes an interest in his work will soon hit upon a pitch which will do the best work. Some use a cutter for the smoother, turned on the corner and a little lip turned up on the front edge of it. A cutter made like this will do very nice work, but it will not do to put it into promiscuous work. It must be used on all soft wood.

There is a great difference of opinion in regard to the temper; a great many fine workmen use a cutter that can be filed and to a certain extent sharpened while in the head, while others will only use one as hard as is possible to use it without nicking. *I* generally use a cutter so that a file will just take hold, but not to file easy. The "Reed feed motion" was a great improvement to the Daniels' mill, and added very much to its capacity for doing work, especially long work, and for planing thin white wood for carriage makers it added a third at least to its value. The Fay mill I consider the best of this class of mills made, for this reason—the feed motion always worked easy. The Ball & Williams mill, while equally as good in other respects, always worked hard in the feed motion, and this is the reason. There is only one cam either on the upper or lower shipping arrangement, and when there is any load at all on it binds on the shaft, for the pressure is all on one side, and it jams over because there is nothing to equalize the strain. The Fay machine has a cam on each side, and the shipping lever lifts from both sides, consequently it cannot jam and always ships easy.

I will just repeat what I had to say about a man taking an interest in his work in order to do good work on a Daniels' planing mill. If a man simply goes to work, as many (alas! too many) do, and just drag the day through and get his time in so as to get his draw on Saturday night, he will not make much headway. But if he takes hold and tries to see how many tunes he can draw out of it, he will find an endless variety, and if he goes to work right they will all be good ones.

So much for the Daniels' planing machine, "Long may it wave."

Chats with Carvers.

FRUIT AS APPLIED TO DECORATIVE PURPOSES.

"So much the more our carvers' excellence."—*Shakespeare.*

NOT only flowers and horticultural forms generally afford excellent materials for the carvers' chisel, but fruit is another section of nature that can also be turned to most profitable account. To trace the various applications of it for decorative purposes since the history of ornament began would prove a most pleasant task to the student. When once leaves and flowers were brought within the range of decorative art, fruit was ere long added to the list and used prolifically. The Greeks paved the way by their charming application of the acanthus, honey-suckle, laurel, myrtle, and berry, and when the Grecian style blossomed into the florid Roman, we find fruit among its sensuous arabesques and tied to the horns of its altars. The goddess Flora was a poetical invention of these times, and her relative grape bedizened Bacchus is familiar to all. Even the capitals of Gothic columns are frequently found made up of flowers or fruit, giving an endless variety, at the same time conforming to the tone of beauty. The free treatment allowed by the Renaissance gave carvers unlimited opportunity to introduce anything they pleased, and fruit came in for a large share of favor. In the colored arabesques of the Italian school the most luscious effects are obtained by the incorporation of autumn's harvest, and the later styles of the French Renaissance would be lost but for the ribbons, fruit, and flowers which are so freely "thrown about." On some of the old Jacobean furniture of our own country various fruits, especially grapes, have been conventionalized with happy results, and a century leter we find the fruit swag of the Queen Anne epoch to be a leading article. Speaking of this period, the name of Grinlin Gibbons at once rises to the lips of the intelligent carver, and this brings us to the point that we wish to chat over with our readers. Gibbons is to some the *beau ideal* of a fruit sculptor, and they stand in raptured astonishment gazing at his work. To depreciate the splendid talents of this carver may be hypercritical, and yet we shall earnestly warn our carver against getting into the same "rut" with him. Apart from the objection that Gibbons belonged to the natural school, there is a repetition and mannerism in his cutting that is objectionable. It is, in fact, neither natural nor conventional. Many of his flowers and much of his fruit cannot be found in nature. They are a smooth, flat species of his own growing, and the plea of conventionality cannot be urged, for his work was intended to be essentially natural. Admitting all this, Gibbons may well be honored as a bygone carver of singular vigor and rare individuality in his particular style. Nevertheless, to those who would copy "Gibbons" in his entirety we say "don't," and for this reason: the man who will place an apple on his bench and reproduce it *exactly* in wood is painstaking and clever, but the one who studies its forms, and makes the fruit and the leaves *into a design* that will cover a panel or form a conventional swag, is the more to be commended. The amount of skilled labor wasted in minute reproductions of "still life" subjects is much to be regretted. When some of the wood exhibited "is out of the carver's own head," it is far more agreeable to contemplate. By all means master the lines of the fruit to be utilized, and then turn the materials thus acquired into something you can call your own design. It is in this sense that the work of Gibbons fails to teach us anything; there is an amount of arrangement, but scarcely any design. Given a ten-penny nail, a bit of ribbon, and some half-dozen kinds of nondescript fruit, and you have the great Queen Anne carver's stock-in-trade as regards that section of his craft,

Example is always better than precept, and it is with pleasure we are able to embody herewith some excellent lessons from the pencil of the late Bruce J. Talbert, a designer who literally doted on natural forms for the filling of his decorative panels. Here we have charming treatments of the promegranate and the grape, setting forth exactly the sort of application we advocate in preference

to the natural school. The spaces are well covered, the designs are capable of being rendered in low relief, and the groundwork of the two upright ones is pleasantly varied. The introduction of a butterfly or some insect, as shown in the grape panel, was a common and pleasing practice of Talbert's, and betrays his love of nature even in its most trifling phases. No man has done more to make carved and painted panels of this class popular than this lamented designer, whose career we notice at length in this journal. Such panels as these are scarcely out of place if applied to any style that admits of such decoration. It must not be understood that the study of fruit or flowers as applied to Renaissance is to be neglected. In such case a certain freedom or naturalistic cutting is essential, but even in these instances let the *mind* as well as the hand of the artificer be seen. Our critical remarks apply more to those painfully natural game and fruit panels that are repeated *ad naseaum* on much cheap Renaissance.

The Stability of Structures.

BY F. E. KIDDER, B. C. E.

V.

Mechanical Principals.

THUS far we have discussed the subjects presented from a purely empirical point of view, and have given only such rules as practice has furnished us. But before we can consider the stability of piers, arches, etc., we must know something about the more important *mechanical principles of construction.*

And before we are prepared for these it is necessary to understand the terms which we shall constantly have occasion to use.

Mechanics is the science which treats of the action of forces.

Rest is the relation between two points when the straight line joining them does not change in length or direction.

Motion is the relation between two points when the straight line joining them changes in length or direction, or in both.

Force is that which changes or tends to change the state of a body in reference to rest or motion. It is a cause, the essential nature of which we are ignorant. Porperly we cannot deal with forces direct, but only with the laws of their action.

Equilibrium is that condition of a body in which the forces acting upon it balance or neutralize each other.

Statics is that part of mechanics which treats of the conditions of equilibrium.

Structures are artificial constructions in which all the parts are intended to be in equilibrium, and at rest, as in the case of a bridge or roof truss. They consist of two or more solid bodies, usually called *pieces,* which are connected at portions of their surfaces called joints.

The *stability* of a structure is its ability to resist displacement of its parts.

This is the branch of mechanics which we are presently to study.

Strength consists in the ability of a piece to resist breaking.

Stress denotes the load or system of forces acting on any piece of material. The intensity of the stress per square inch on any normal section of a solid is the total stress divided by the area of the section in square inches. Thus, if we had a rectangular strut or post, 8x10 inches, with a load or stress 48,000 pounds distributed over any cross-section the intensity of the stress on the cross section would be 48.000÷80=600 pounds.

Strain.—When a solid body is subjected to any kind of stress an alteration is produced in the volume and figure of the body, and this alteration is called the strain. In the case of the post given above the strain would be the compression of the post caused by the load.

The ultimate strength, or *breaking load* of a body is the load required to produce the fracture in some specified way.

The *safe load* is the load that a piece can support without impairing its strength

The *factor of safety* denotes the ratio in which the breaking load exceeds the safe load.

DEAD AND LIVE LOADS.

The term dead, as used in mechanics, means a load that is applied by imperceptible degrees and that remains steady, such as the weight of the structure itself.

A *live load* is one that is applied suddenly or accompanied with vibrations; such as swift trains traveling over a railway bridge, or a force exerted in a moving machine. It has been found by experience that the effect of a live load on any piece of a structure is twice as severe as that of a dead load of the same weight, hence a piece of material designed to carry a live load should have a factor of safety twice as large as one designed to carry a dead load.

The load produced by a crowd of people walking on a floor is usually considered to produce an effect which is a mean between that of a dead and living load, and a factor of safety is adopted accordingly.

Force represented by a straight line.—In considering the stability of structures, it is often desirable to represent the forces acting on the structure graphically.

Now, a force can be fully represented by a straight line having an arrow head, as in Fig. 1. The length of the line if drawn to a scale of pounds, shows the value of the force in pounds, the direction of the line indicates the direction of the force, the arrow head shows which way it acts, and the point A denotes the point of application. Thus we have the direction, magnitude and point of application of the force represented, which is all that we need to know.

IMPORTANT PROPOSITION REGARDING THE COMPOSITION AND RESOLUTION OF FORCES.

In studying the action of forces in structures, it will be necessary to thoroughly understand the following propositions :

PARALLELOGRAM OF FORCES.

I.—*If two forces applied at one point and acting in the same plane be represented by two straight lines inclined to each other, their resultant will be equal to the diagonal of the parallelogram formed on these lines.*

Thus, if the lines A B, A C (Fig. 2), represent two forces acting on one point A, and in the same plane, then to obtain the force which would have the same effect as the two forces we complete the parallelogram A B, D C, and draw the diagonal A D. This line will then represent the resultant of the two forces.

When the two given forces are at right angles to each other, the resultant will, by geometry, be equal to the square root of the sum of the squares of the other two forces.

THE TRIANGLE OF FORCES.

II.—*If three forces acting on a point be represented in magnitude and direction by the sides of a triangle taken in order, they will keep the point in equilibrium.*

Thus, let P, Q and R (Fig. 3) represent three forces acting on the point O. Now, if we can draw a triangle like that shown by dotted line, whose sides shall be respectively parallel to the forces, and shall have the same relation to each other as do the forces, then the forces will keep the point in equilibrium. If such a triangle cannot be drawn, the forces will be unbalanced and the point will not be in equilibrium.

THE POLYGON OF FORCES.

III.—*If any number of forces acting at a point can be represented in magnitude and direction by the sides of a polygon taken in order they will be in equilibrium.*

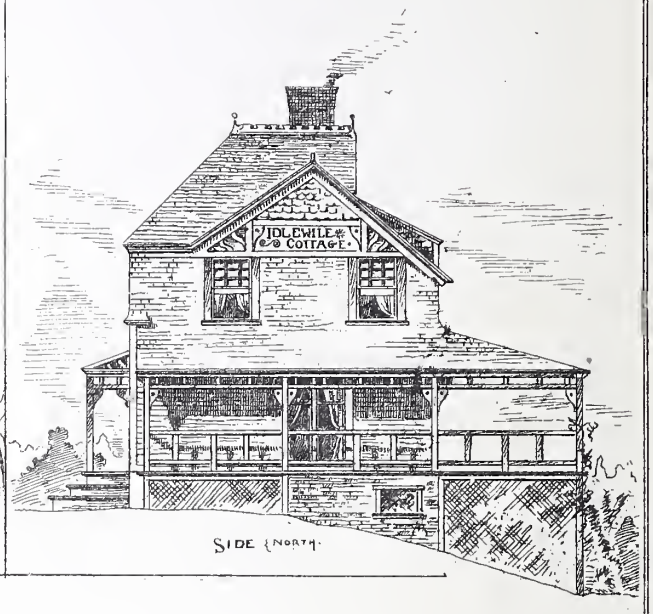
This proposition is only the preceding one carried to a greater extent.

MOMENTS.

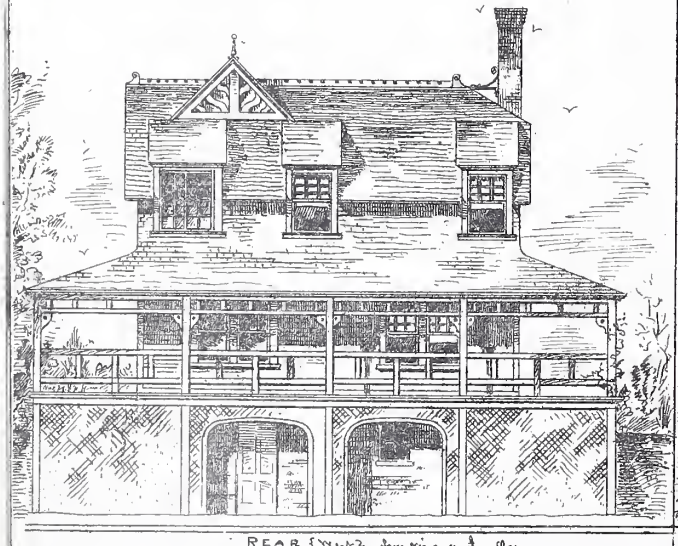
In considering the stability of structures and the strength of materials, we are often obliged to take into consideration the *moments* of the forces acting on the structure or piece, and it is very essential that the reader should thoroughly understand what the moment of a force is.

PLATE No. 26

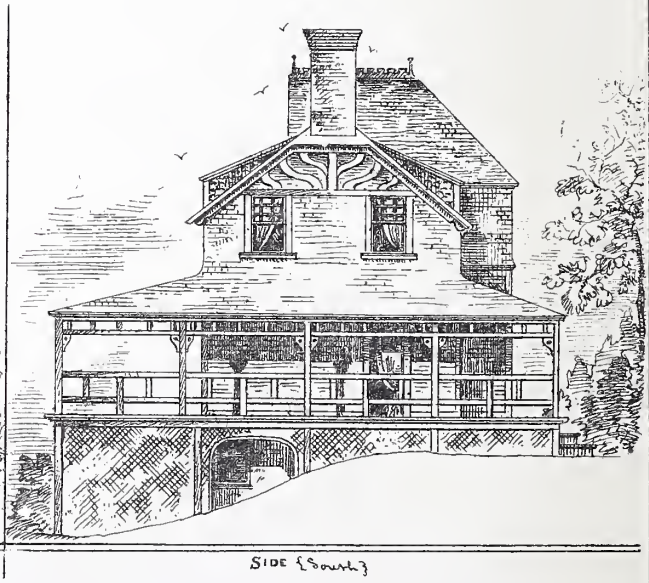
FRONT (EAST) fronting on the street.



SIDE (NORTH)



REAR (West) fronting on the Ocean.

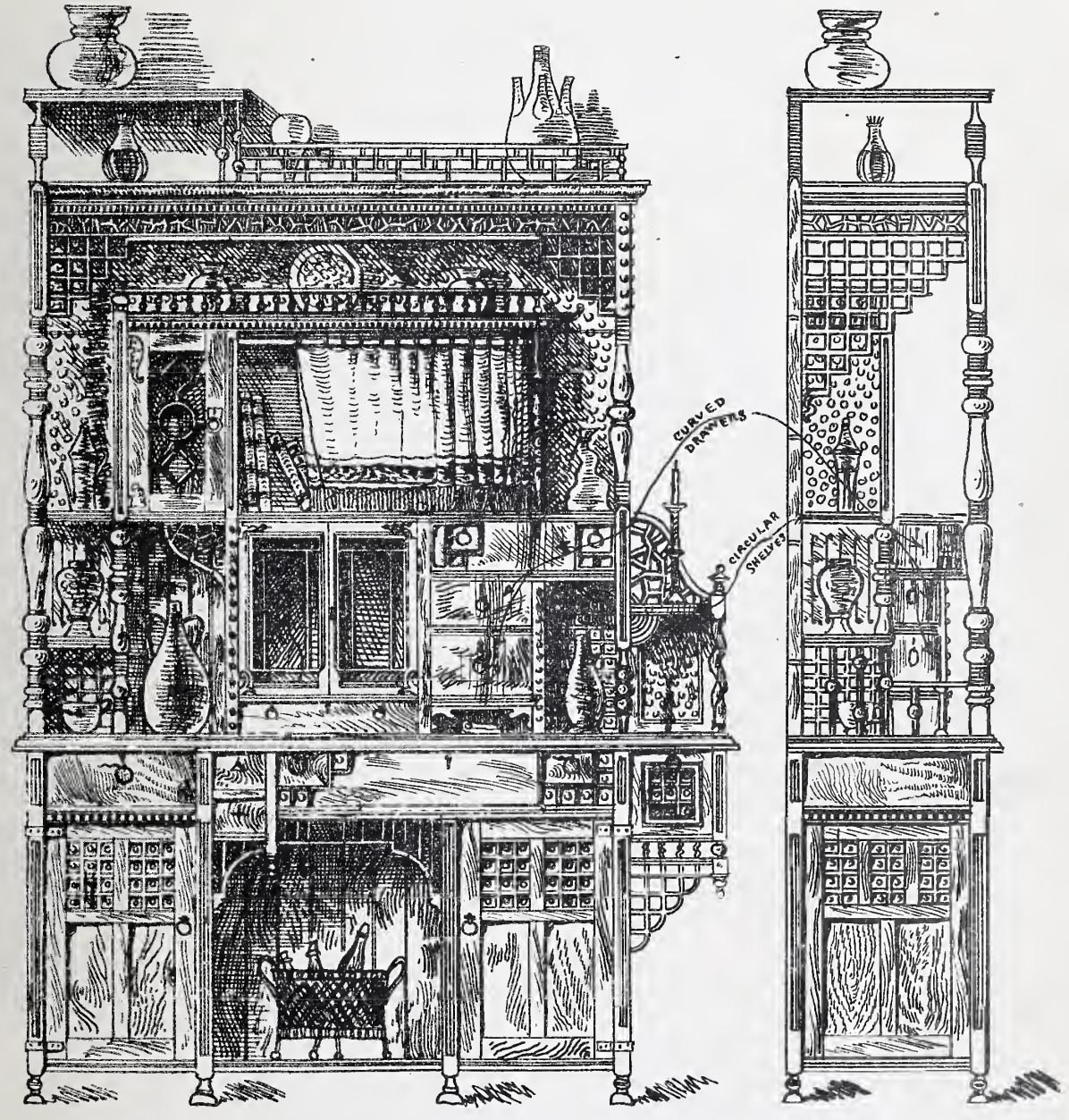


SIDE (South)

PLATE No. 27

Cabinet

By E. G. W. Dietrich, Des. & Del.,
356 Henry St.,
Brooklyn, N.Y.



Front.

End.

When we speak of the moment of a force we must have in mind some fixed point about which the moment is taken.

The moment of a force about any given point may be defined as the product of the force into the perpendicular distance from the point to the line of action of the force. Or in other words the moment of a force is the *product of the force with the arm with which it acts.*

Thus if we have a force Fig. 4, and wish to determine its moment about a point P, we determine the perpendicular distance P *a*, between the point and the line of action of the force and multiply it by the force in lbs. For example if the force F were equal to a weight of 500 lbs., and the P a were 2 inches, then the moment of the force about the point P would be 1,000 inch lbs.

The following important propositions relating to forces and moments should be borne in mind in calculating the strength or stability of structures.

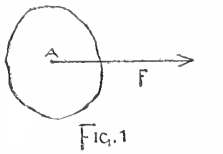


Fig. 1

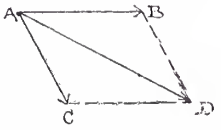


Fig. 2

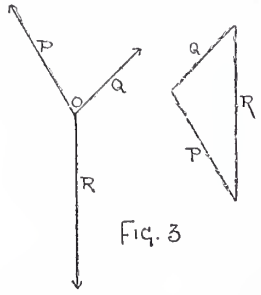


Fig. 3

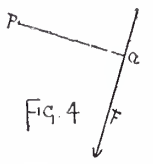


Fig. 4

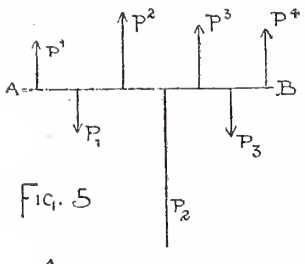


Fig. 5

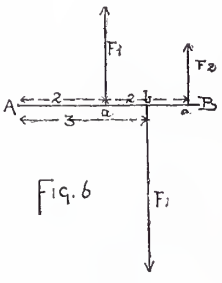


Fig. 6

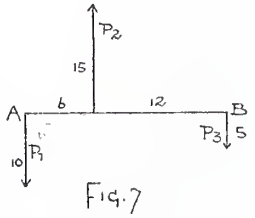


Fig. 7

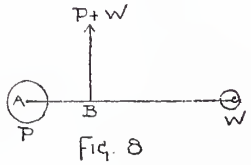


Fig. 8

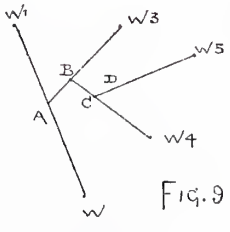


Fig. 9

IV.—*If any number of parallel forces act on a body, that the body shall be in equilibrium, the sum of the forces acting in one direction must equal the sum of the forces acting in the opposite direction.*

Thus if we have the parallel forces P^1 P^2 P^3 and P^4, acting on the rod A B, Fig. 5, in the opposite direction to the forces P_1 P_2 P_3 then if the rod is in equilibrium the sum of the forces P_1 P_2 P_3 and P_4 must equal the sum of the forces P_1 P_2 and P_3, also

V.—*If any number of parallel forces act on a body in opposite directions, then the sum of the moments of the forces acting in one direction about any given point in the body, must equal the sum of the moments of the opposite set of forces acting about the same point if the body is to be in equilibrium.*

Thus let Fig. 6 represent a number of parallel forces acting on a rod. Let F_1 F_2 act in one direction and F_3 in another, then that the rod may be in equilibrium F_3 must equal the sum of F_1 and F_2. Also the moment F_3 about any point in the rod must equal the sum of the moments of F_2 and F_1 about the same point. For example, let the forces F_1 F_2 each be represented by 5, and let the distance A *a* be represented by 2, and the distance A *c* by 4. The force F_3 must equal the sum of the forces F_1 and F_2, or 10; and its moment must equal the sum of the moments of F_1 and F_2. If we take the moments around A, then the moment of $F_1 = 5 \times 2 = 10$, and of F_2 $5 \times 4 = 20$. Their sum $= 30$, hence the moment of F_3 must be 30, dividing the moment 30 by the force 10, we have for the arm 3, or the force F_3 must act at a distance 3 from A to keep the rod in equilibrium.

THE PRINCIPLE OF THE LEVER.

This principle is based upon the two preceding propositions and is of great importance and convenience.

VI.—*If three parallel forces acting in one place balance each other then each force must be proportional to the distance between the other two.*

Thus if we have a rod A B, Fig. 7, with three forces P_1 P_2 P_3 acting on it, that the rod shall be balanced, we must have the following relation between she forces and their points of application, viz.:

$$\frac{P_1}{CB} : \frac{P_2}{AB} : \frac{P_3}{AC};$$

$$\text{or, } P_1 : P_2 : P_3 = BC : AB : AC.$$

This is the case of the common lever, and gives the means of determining how much a given lever will raise.

Example.—Let the distance A C be 6 inches, and the distance C B be 12 inches. If a weight of 500 lbs. is applied at the point B, how much will it raise at the other end, and what support will be required at C?

Answer.—Applying the rule just given, we have the proportion:

$$P_3 : P_1 = AC : CB, \text{ or } 500 : (P_1) = 6 : 12.$$

Hence $P_1 = 1{,}000$ lbs., or 500 lbs. applied at A will lift 1,000 suspended at A. The supporting force at C must by proposition IV, be equal to the sum of the forces P_1 and P_3 or 1,500 lbs. in this case.

CENTRE OF GRAVITY.

The lines of action of the force of gravity converge towards the centre of the earth; but the distance of the centre of the earth from the bodies which we have occasion to consider, compared with the size of those bodies, is so great that we may consider the lines of action of the forces as parallel. The number of the forces of gravity acting upon a body may be considered as equal to the number of particles composing the body.

The Centre of Gravity of a body may be defined as the point through which the resultant of the parallel forces of gravity acting upon the body, passes in every position of the body.

If a body be supported at its centre of gravity, and be turned about that point, it will remain in equilibrium in all positions. The resultant of the parallel forces of gravity acting upon a body is obviously equal to the weight of the body, and if an equal force be applied acting in a line passing through the centre of gravity of the body, the body will be in equilibrium.

EXAMPLES OF CENTRES OF GRAVITY.

Centre of Gravity of Heavy Particles.—Centre of gravity of two particles. Let P be the weight of a particle at A (Fig. 8), and W that at C.

The centre of gravity will be at some point B, on the line joining A and C. The point B must be so situated that if the two particles were held together by a stiff wire, and were supported at B, by a force equal to the sum of P and W, the two particles would be in equilibrium.

The problem then comes under the principle of the lever, and hence we must have the proportion,

$$B + W : P = AC : BC \text{ or } BC = \frac{P}{P+W} AC$$

If $W = P_1$, then B $c^2 =$ A C, or the centre of gravity will be half way between the two particles. This problem is of great importance for it presents itself in many practical examples.

Centre of Gravity of several Heavy Particles.—Let w_1 w_2 w_3 w_4 and w_5, Fig. 9, be the weights of the particles.

Join w_1 and w_2 by a straight line and find their centre of gravity A, as in the preceding problem. Join A with w_3 and find the centre of gravity B, which will be the centre of gravity of the three weights w_1 w_2 and w_3. Proceed in the same way with each weight and the last centre of gravity found will be the centre of gravity of all the particles.

In both of these cases the lines joining the particles are supposed to be horizontal lines, or else the horizontal projection of the real straight line which would join the points.

Recent Improvements in the Mechanic Arts.

Written for the BUILDER AND WOODWORKER by F. B. Brock, Solicitor of Patents, Washington, D. C.

A NOVEL combination of a register for heating-flues, and an ottoman or like article of furniture, consists of an ottoman frame provided with doors in its sides, whereby it is adapted to receive and distribute heat from a register opening located therein.

A LATE English invention consists of an adjustable mantel. The jambs are vertically adjustable, and the frieze, shelf, etc., are laterally adjustable. Panels are adjusted in grooves in the jambs.

A NEW house-ventilator contemplates regulating automatically the escape of air from an apartment and to provide for excluding backdraft. To this end a frame built in the wall or loosely inserted in the flue, or in direct contact with the atmosphere, is provided with spindles arranged at an angle to the face of the frame which carry suitable valves which only serve to transmit air from the room and close when there is the slightest backdraft. When the frame is built in the chimney a longitudinally arranged division plate is provided therein whereby the escape of air from the room is not effected by any downdraft. A wind cap on the outside is essential to this construction.

A NOVEL bath-tub is pivoted at the end next the faucets so that it may be swung upwardly and rest wholly within a suitable upright casing. For this purpose it is raised by cords running over pulleys to which is attached a counterweight. Splashers are provided to prevent soiling the adjacent walls of the apartment. A flexible joint is provided whereby the oscillation of the tub will not affect the drain pipe.

A NEW method of uniting ornamental wood for floor coverings consists of introducing lead or other suitable metal into grooves in the blocks in a molten condition.

A LATE improvement in lathe-chucks consists essentially of the ordinary shell of a chuck provided with four radially and circumferently arranged recessed enlargements. Four radial chuck spindles are provided with collars to bear against the inner walls of the recesses in the enlargements, and bushings are secured in said recesses and arranged to bear against the said collars and hold the spindles in position.

A NOVEL device for securing roofing material upon roofs consists of a sheet metal strip having a series of flexible points normally projecting at right angles from its surface. Means are provided for securing this strip permanently to the roof. A second strip is perforated with a series of apertures corresponding to the projecting point of the first strip, whereby the edges of a roofing fabric may be secured to each other and to the roof by the interlocking of the two metallic strips between which they are placed.

A RECENT invention in wood-bending machines has a spring-follower constructed with a spring having two compressing heads connected and adjustable by means of one or more bolts having nuts, whereby said spring may be compressed or relaxed as desired, and movable upon ways or guides on the bending lever. The spring-follower is also compressible by means of a stationary screw in the end of said bending-lever.

A RECENT invention in mortising chisels has been patented, it being issued after an interference with Letters Patent No 234,664, the present inventor establishing priority. This chisel is provided on its back with a longitudinal groove which has its sides or flanks serrated to form horizontal cutters or teeth.

A NEW wood-turning lathe has a tool carriage provided with an interchangeable toolrest through which the stick passes, and is provided with a roughing tool which is pivoted to a vertically adjustable-arm and which is itself vertically adjustable for the purpose of causing it to bear on said ring. A knee lever and crank wheel are provided with a flexible connection between the same, which allows of an unvarying leverage and an instantaneous release of the tool from the finished work.

Measuring Dressed Lumber.

A PLANING-MILL owner in the South submits the following: "Please state through the columns of your valuable journal the rules or customary ways of measuring flooring and ceiling as it goes to the planer. Namely, if a board is six inches wide and twelve feet long, would it be measured as having six feet of contents when it comes from the machine? Again: if a board be twelve feet long and six inches wide as sawed, but so crooked upon its edges that an inch in the width must be lost in dressing, would it be measured as six feet, or as but five when dressed? In other words, will you give us the customary rules for measuring dressed and matched ceiling and flooring?"

Lumber passing through a machine is measured as though in the rough. A six-inch strip of course loses in its width by dressing, but it is customary to call it six-inch strip still when computing it for measurement and sale. Before the days of machine dressing, a purchaser bought his lumber in the rough and handed it over to his carpenter to prepare for laying on the floor. He did not ask the manufacturer to sell it to him for what it would absolutely measure when dressed, neither did he expect the carpenter to pay for the decrease caused by dressing. This was a loss which was as much a contingent necessity as was the loss of ends or widths in boards which must needs be cut to fill a certain place in the work. It was a loss which was figured for in the estimated cost of the material needed for the building. The introduction of machinery did not shift the responsibility of this loss; it simply provided for doing more cheaply and efficiently the labor which had hitherto been done by hand. The loss remaines the same, and upon the same party. Hence no change in the custom of measureing took place on the introduction of machine dressing.

The second proposition of our correspondent, however, introduces a different element. If a board is crooked it must be measured straight, if entitled to measurement in the grade for which it was intended. Usually crooked lumber loses in grade, but if passed, can be measured only for what it will make. If it is a wedge strip, it is to be measured at its narrow end, for it can only make so wide a piece of flooring as can be manufactured with parallel lines. If it is crooked so that an inch is lost in making it straight, the loss falls on the manufacturer at the sawmill, not up in the planing-mill and only to the reasonable extent of ordinary loss in dressing upon the purchaser of the planed lumber. Such a strip as our correspondent describes should be measured at five inches in the rough, and would be considered as a piece of five-inch flooring when matched and dressed. This rule holds good in all markets of which we have knowledge.—*Nor'-Western Lumberman.*

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor of the BUILDER AND WOOD-WORKER:

In the BUILDER for Sept., 1879, is advertized the Rodier Single Iron Plane, made by the Laflin Mfg. Co, Westfield, Mass. You also speak of it editorially on page 210, same No. Wishing to get a set of iron planes I wrote to them for a circular, and received it within *ten days*. The price was $11.50. I wrote to them again asking them what discount they would allow me from price list; they said they would send me a set for $10. I sent the money on the 17th of last Sept. Waiting four weeks and not hearing from them, I wrote again, and received a postal card, saying that they were away behind on plane orders, and mine would receive attention in its turn. Waiting another month, I wrote again and received a postal card saying:

"We shall be unable to send a plane for a week or two yet, as we are very much troubled in getting different parts for them.

LAFLIN MFG. CO."

Waiting to the 1st of February, and not hearing from them, I wrote to the postmaster at Westfield, also to the president, H. C. Shute, asking him to send me the planes within ten days, or return the money at my expense. Up to date I have not heard from him. From the postmaster I received a postal card, saying, that the "Company's property is attached, and is threatened with bankruptcy." Now they knew before they got my money that they could not or would not, send the planes. I think they are worse than a set of *sneak thieves.*

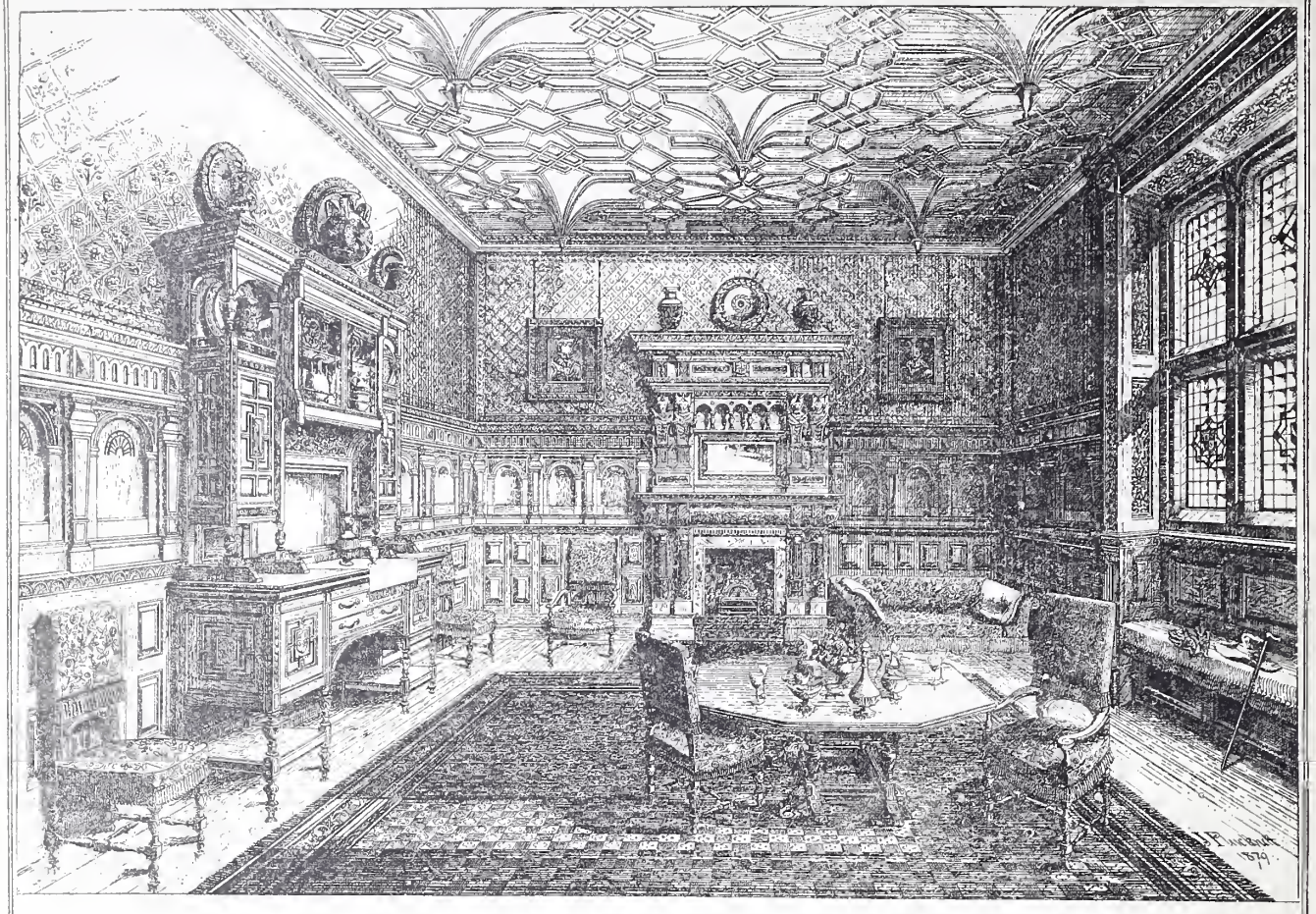
I write this to caution your readers against them. There may be others that would send and get taken in, as I have been. Do you think I can do anything about it?

Respectfully yours, A. MURRAY.

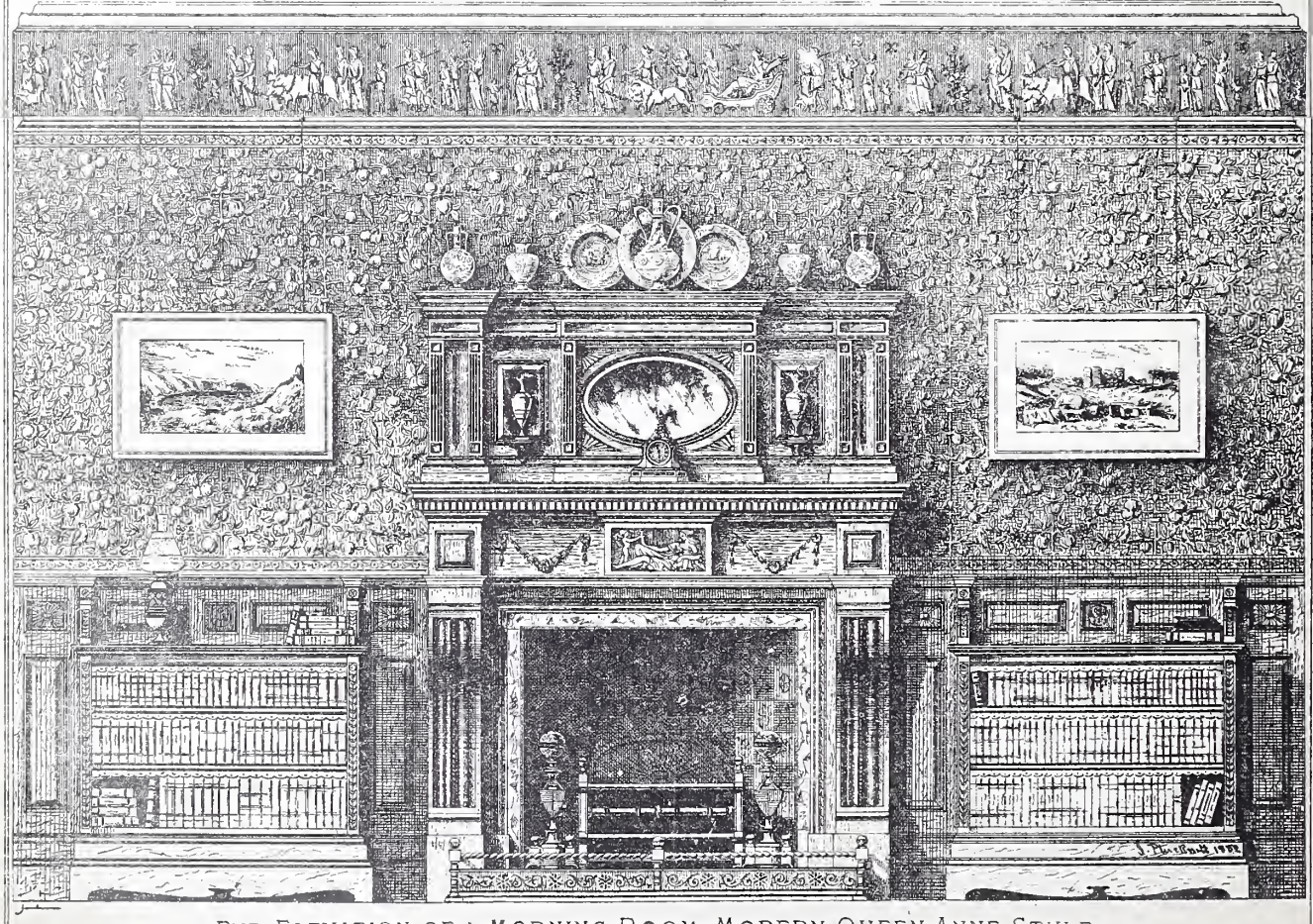
AGRICOLA, KANSAS, Feb. 20, 1882.

Editor of the BUILDER AND WOOD-WORKER:

Inclosed you will find a plan and elevation of the turnout at the starting of a stair-case. Also the operation of finding the mould for the wreath, which your correspondent, W. B. G., wishes an example of.

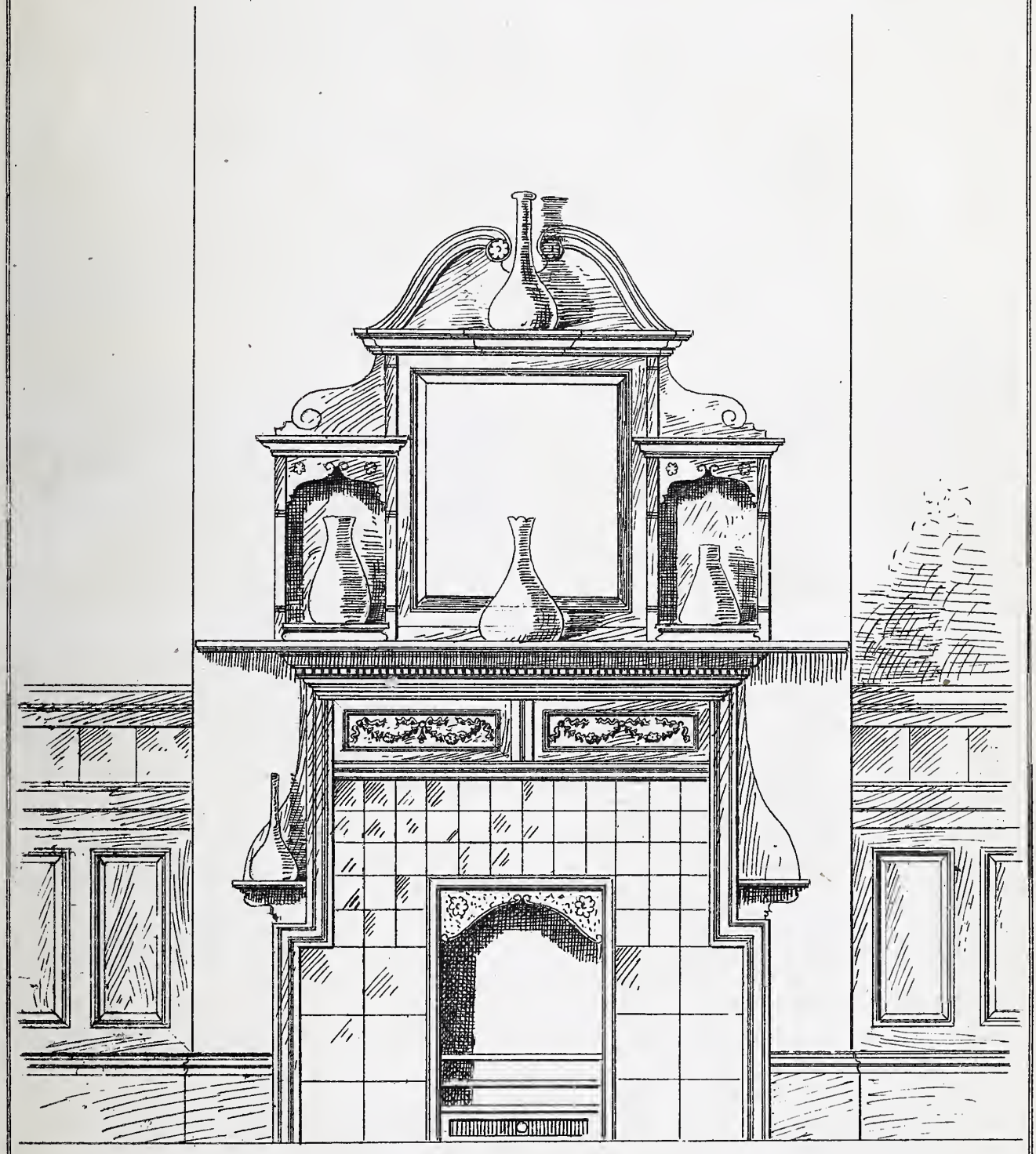


INTERIOR OF A STUART DINING ROOM.



END ELEVATION OF A MORNING ROOM, MODERN QUEEN ANNE STYLE.

PLATE No. 29

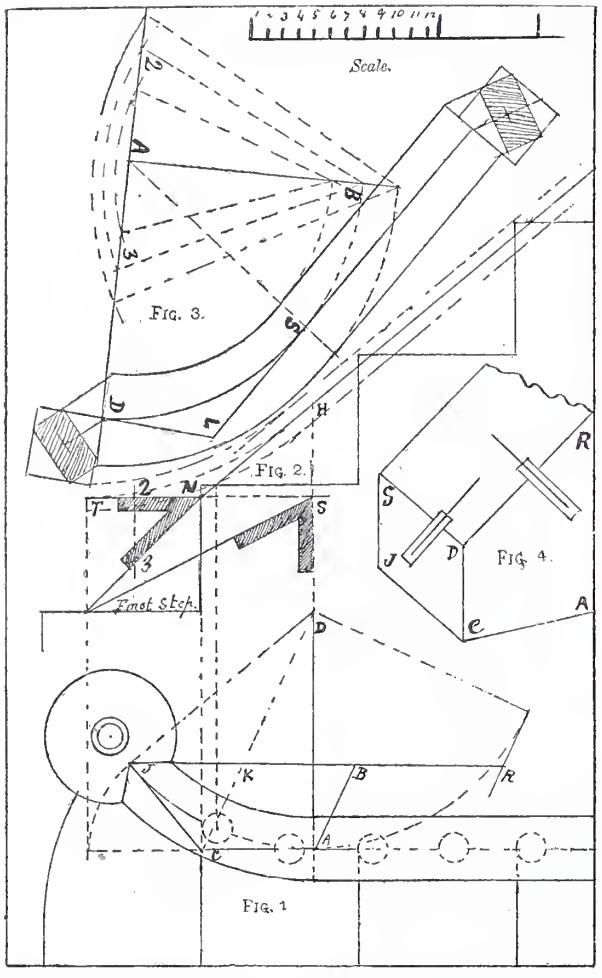


PARLOR MANTEL

EDWARD NEWSON ART DESIGNER
28 STATE ST. BOSTON

The plan and elevation of the turnout is shown at Fig. 1 and Fig. 2.

To find the length of the major axis of the eliptical curve for the centre of the mould. Draw A, B, Fig. 1, parallel to C D, equal to S H, Fig. 2, join J B, and extend to R ; then K R equals half the length of the major axis, and J B the length of the eliptical curve required for the mould.



To form the mould at Fig. 3, draw the major axis indefinitely, square up from A to B equal to A D Fig. 1, set off from A to D equal to K R Fig. 1. To find the points for the pins to describe the centre curve ; from the point B as centre, with K R, Fig. 1, as radius describe arcs cutting the major axis at 2 and 3, the points required.

To find the length of curve, from the point D as centre, with J B, Fig. 1, as radius, describe an arc, cutting the curve at S, the length required. To find the direction of the straight wood ; from the point D as centre, with T N, Fig 2, as radius, describe an arc at L, then from the point S as centre, with N H, Fig. 2, as radius, describe an arc, cutting the arc A, from the point of intersection draw the tangent D L and L S, the direction required for the straight wood.

To find the width of the mould, set off from N to 2, Fig. 2, the width of the rail, then N 3 equals the width of the mould at D. The points for the pins to describe the outside and inside curves, are found in the same manner as those for the centre curve. The operation of finding the bevels geometrically is shown at Fig. 2. At Fig. 4 we have shown the operation practically as follows : from a piece of wood to the angle of the tangents J C A, Fig 1, draw D S at right angles to C D, and D R, the pitch of the stairs, cut to the lines, apply the bevel to the angle D S for the joint at D, and to the line D R for the joint on the straight wood.

Note in drawing the elevation of the staircase, square up from the intersection of the tangents J C A, Fig. 1, to the point N ; then from the point N draw the pitch N H ; from the centre of baluster C, Fig. 1, draw the dotted line to intersect the pitch line, which determines the position of the steps and risers, and the height of the newel post.

LUCIUS D. GOULD.

NEW YORK, March, 20, 1882.

Wood Polish and Stain from Carnauba Wax.

AN improved stain and polishing compound has been made by Herr G. Glabey, of Nuremberg, from carnauba wax, for which he has recently obtained Letters Patent in Germany. The invention consists in the use of carnauba wax in a hydrated state, combined with metallic and other oxides and coloring matters for preparing stains, polishing and scouring matters. The carnauba wax surpasses all other kinds by its hardness, and by melting at not less than 206° Fahr. Between the teeth it breaks into pieces without mollifying, and when applied in a hydrated state in connection with other substances produces an excellent durable lustre and protects against the penetration of humidity. The polishing material is prepared in the following manner: Dissolve 1 part of soap in 30 parts of boiling water, to this add an equal quantity of carnauba wax and boil the whole until the wax is dissolved, and looks like white milk. Then pour in a quantity of caustic ammonia until the milky solution of wax has become clearer; let it cool. According to what the polishing matter is intended for, precipitate this solution of wax with a solution of alum, sulphate of magnesia, iron or zinc, etc., thus obtaining precipitates of combinations of sebacics and carnauba wax acids with the bases of the above mentioned salts. After washing out these precipitates, mix the compounds thus obtained with a small quantity of caustic ammonia and the precipitates of the desired color. To get, for instance, a black color, use a decoction of campeachy wood and acid chromate of potash. It is to be understood that polishing matters differ from those generally used by their not being composed of a mixture of beeswax and soap solution, soluble in water like the latter, but of chemical combinations of sebacic, and especially carnauba wax acid with the oxides of the above mentioned salts and coloring matters.—*Boston Jour. of Commerce.*

THIS department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery ; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future refereuce. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Questions.

41. OIL STONE.—Will some one of your readers inform me through these pages what to do with an oil stone that has become too hard ? I have a stone that is quite hard and it takes too much time to sharpen my tools with it.—HURLEY.

42. GRINDSTONE.—Answers to the following questions will be considered a favor : (1.) What is a "hacker ?" (2.) Can I true up a grindstone by running with a foot-power, and if so, please explain how ?—BEGINNER.

43. HALL FURNISHING.—Having derived a great deal of benefit and valuable information from your paper, and seeing that you invite "questioners" to take part in this department, and make known their wants, I tremblingly knock at your door and ask for a little information regarding furnishing a large hall. Will it be the "proper thing" to have a large sized table in the hall, a cushioned seat or bench and a mirror-frame, besides the accustomed hat-rack and cane-stand ? I have ample room, and any suggestions will be appreciated.—MINERVA.

44. DECAY IN TIMBER.—Will you please state what is the cause of decay in timber ? I mean the chemical course of decay.—QUIZ.

45. ROUGH CASTING.—I want to do some rough casting on an old brick wall ; what steps should I take to make the mortar stick well to the walls ?—MORT.

46. POLISHING WOOD-WORK.—Would like to know how to polish wood-work ; and would be thankful for information and instructions on that subject ?—A NEW READER.

47. MONOGRAMS.—If some of your artists would give designs for "Monograms" of the followiug combinations, the act would be appreciated by a number of your amateur readers in this city ?—J. H. C.—E. C.—and S. A. H.—PHILADELPHIA.

Answers.

We wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

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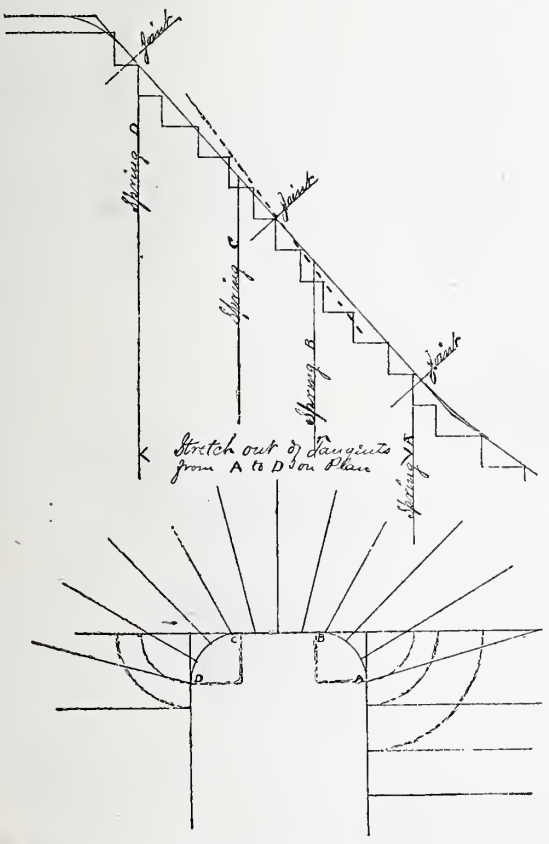
25. Geometry.—If H. B. B. will obtain a copy of "Riddell's Geometry," or even of "Bell's Carpentry Made Easy," he will have all the geometry he requires for practical purposes, if he masters all either of the books contains.—Neff.

25 Geometry.—There is no easy way of acquiring the science of geometry. If H. B. B. will secure a good edition of "Nicholson's Encyclopedia of Architecture," he will find in there all the geometry he will ever require in his business, and its application to the purposes for which he would require it. In my opinion there is no work published as thoroughly and comprehensive as Nicholson's work. I paid $30 for mine, (2 large vols.), but I would not part with it for twice the money. It is a builder's library in itself.—Joiner.

26. Hand Railing.—I forward a sketch for hand railing. The dotted line on elevation of tangents show the position it would be to answer the way he would like. Further explanation is unnecessary.—W. A. C.



26. Hand Railing.—Build your stairs, if you know how, if not, get some one that does know, or send the size of your room to the editor for me, and I will give you a plan, and for $3.00 will send the American Stair Builder's Guide, which I think will serve you better than Riddell's system, as being simpler and easier understood.—L. D. G.

29. Stair Soffit.—You can either stave it up or form a drum the size required, and bend a piece of stuff around it by dadoing it at the angle of elevation, and keying it; after which, lay on glued canvas. If both sides are exposed, you will have to put it up in sections with the grain of the wood parallel to the string of the stairs.—L. D. G.

30. Winders.—The rail is not affected, consequently requires no remedy.—L. D. G.

31. Thickness of Handrail.—A plan to obtain all you ask for is shown and described in another column of the present issue.—Ed.

33. Planing Mill.—We are making arrangements to get an improved plan of a planing mill for reproduction, and will probably have it ready for next issue.—Ed.

34. Renovating Old Floors.—Have the floors scrubbed clean, let them get perfectly dry. Plane off the high parts with a smoothing-plane. Use a bull-nosed plane near the base or mop-board. When smooth, stain with umber mixed in a solution of water and glue: apply boiling hot. When dry, smooth off with No. ½ sandpaper, then give a good coat of boiled oil; let this dry and you will have a floor that will hold its color for many years. The glue will help to keep the shaky parts solid.—Neff.

36. Polishing Turned Work.—Turned articles must be brought to a fine, smooth surface with the finest sandpaper, and the direction of the motion should be occasionally reversed, so that the fibers which are laid down by rubbing one way may be raised up and cut off. To apply the polish, which is merely a solution of shellac in alcohol take three or four thicknesses of linen rag and place a few drops of polish in the center; lay over this a single thickness of linen rag and a drop or two of raw linseed oil over the polish. The rubber is then applied with light friction over the entire surface of the work while revolving in the lathe, never allowing the hand or mandrel to remain still for an instant, so as to spread the varnish as even as possible, especially at the commencement, and paying particular attention to the internal angles, so as to prevent either deficiency or excess of varnish at those parts. The oil in some degree retards the evaporation of the spirit of the varnish, and allows time for the process; it also presents a smooth surface and lessens the friction against the tender gum. When the varnish appears dry, a second, third and even further quantities are applied in the same manner, working, of course, more particularly upon those parts at all slighted in the earlier steps,

Flat surfaces are polished in a similar manner. The wood must be filled, as it is called, and for this there is nothing better than whiting, colored so as to resemble the wood and kept dry. Rub the latter well with linseed oil, and then sprinkle it with whiting. Rub the latter well in, wipe it off carefully, and give time to dry. This is far superior to size.

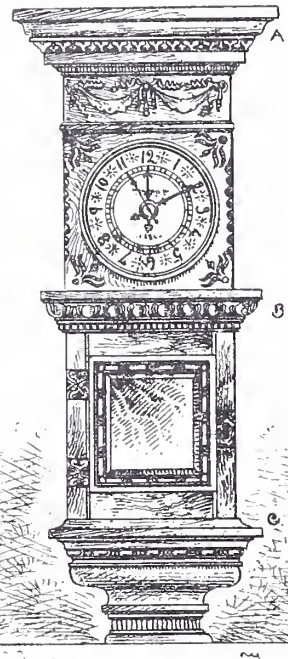
The polisher, however, generally consists of a wad of list, rolled spirally, tied with twine and covered with a few thicknesses of linen rag. Apply a little varnish to the middle of the rubber, and then inclose the latter in a soft linen rag, folded twice. Moisten the face of the linen with a little raw linseed oil, applied to the middle of it by means of the finger. Pass the rubber quickly and lightly over the surface of the work in small circular strokes, until the varnish becomes nearly dry; charge the rubber with varnish again, and repeat the rubbing till three coats are laid on, when a little oil may be applied to the rubber and two more coats given it. Proceed in this way until the varnish has acquired some thickness, then wet the inside of the linen cloth, before applying the varnish; with alcohol and rub quickly, lightly and uniformly the whole surface. Lastly, wet the linen cloth with a little oil and alcohol, without varnish, and rub as before till dry. Each coat is to be rubbed until the rag appears dry; and too much varnish must not be put on the rag at one time. Be also very particular to have the rags clean as the polish depends in a great degree upon keeping everything free from dust and dirt.—Adept.

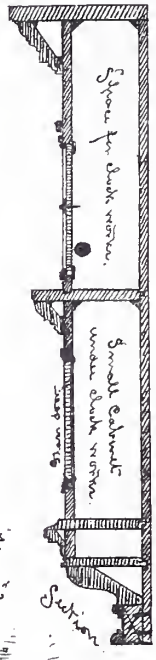
38. Grinding Tools.—Edged tools are fitted up by grinding, very much as a plank would be reduced in thickness were a large plane employed in which were set a hundred or more very small gouges, each cutting a narrow groove. The sharp grit of the grindstone being harder than the iron or steel, cuts very small channels in the surface of the metal, and the revolving disc carries away all the minute particles that are detached by the grit. If we were to examine the surface of a tool that has just been removed from the grindstone under the lenses of a powerful microscope, it would appear as it were, like the rough surface of a field which has recently scarified with some implement which formed alternate ridges and furrows. Hence, as these ridges and furrows run together from both sides, at the cutting edge, the newly ground edge seems to be formed of a system of minute teeth, rather than to consist of a smooth edge. For this reason, a tool is first ground on a coarse stone, so as to wear the surface of the steel away rapidly: then it is polished on a wheel of much finer grit; and finally, in order to reduce the serrature as much as possible, a whetstone of the finest grit must be employed. This gives a cutting edge having the smallest possible serration. A razor, for example, does not have a perfect cutting edge, as one may perceive by viewing it through a microscope. Beginners are sometimes instructed, when grinding edge-tools, to have the stone revolve toward the cutting edge, and sometimes from it. When the first grinding is being done, it is a matter of indifference whether this is done or not; but when the finishing touches are applied near and at the very edge, a grinder can always complete his task with more accuracy if the periphery of the grindstone revolves toward the cutting edge, as the steel that is worn away will be removed more easily; whereas, when a stone runs in the opposite direction, the grinder cannot always tell exactly when the side of the tool is fully ground up to the edge. This is more

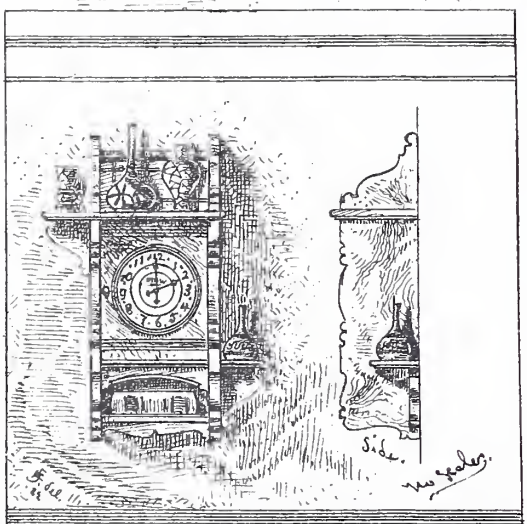
·BUILDER· AND ·WOOD·WORKER·

PLATE Nº 30

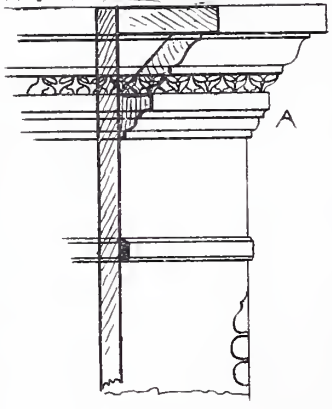
·HELPS·TO·AMATEURS·SERIES·

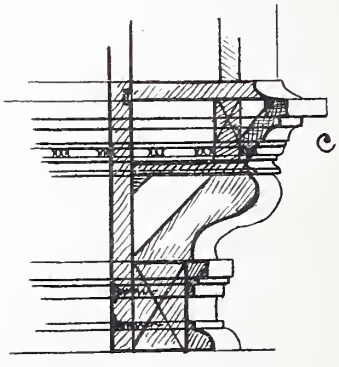


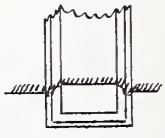


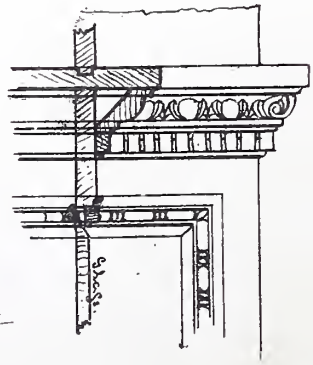


Suggestion for a Simple Clock Case.







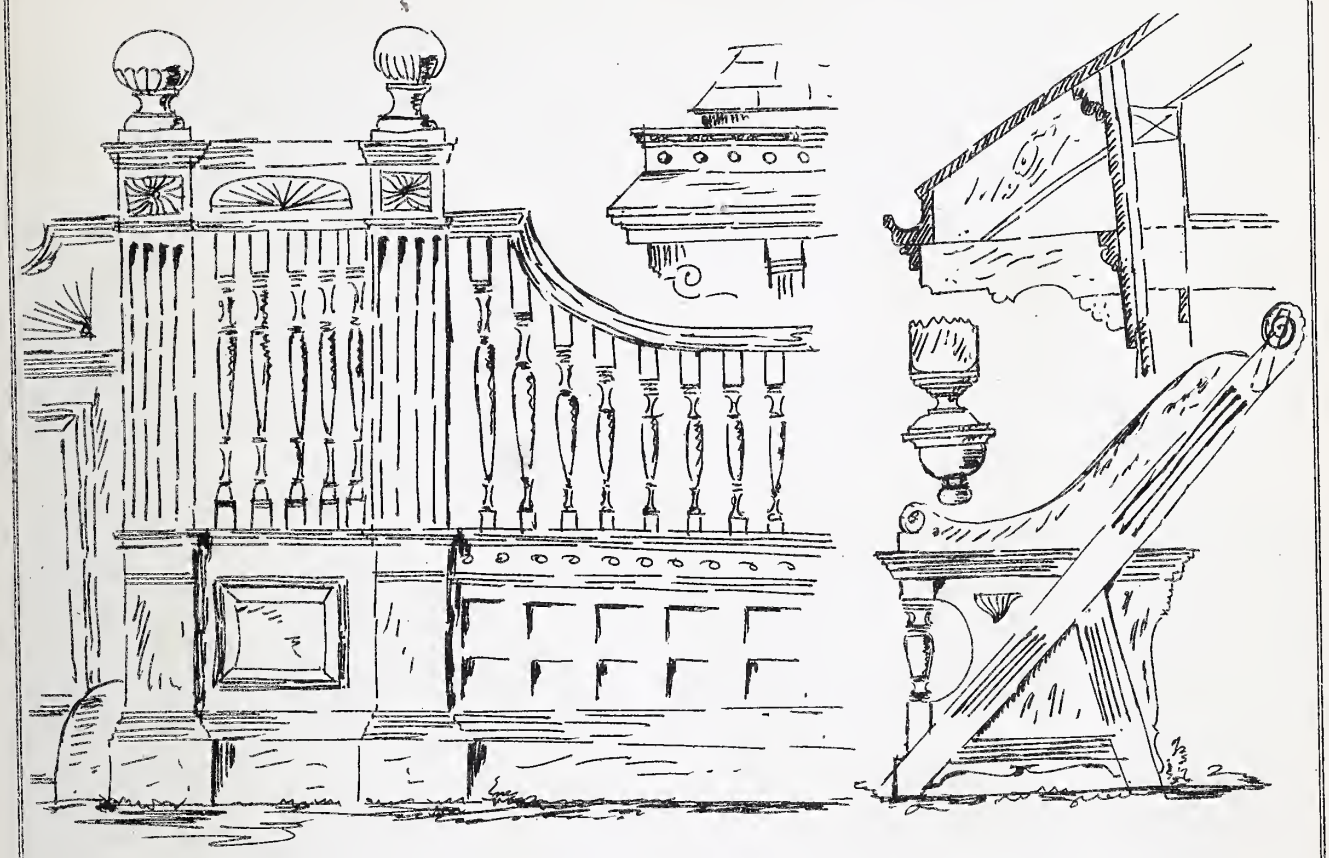


·CLOCK CASE·
·AND·
·DETAILS·

·SCALE FOR ELEVATIONS· OF CLOCK.
1FT. 2FT

·SCALE FOR DETAILS·
12 IN. 6 CM

PLATE No. 31



Gould & Angell Archts
Providence, R.I.

especially true when the steel has a rather low or soft temper. The stone, when running from the edge, will not sweep away every particle of the metal that hangs as a "feather;" but when the stone revolves toward the edge, there will be no "feather edge" to deceive the eye of the grinder.—ADEPT.

40. CONCRETE.—Materials: Half measure of Portland cement, half measure of air-slaked lime sifted through a fine sieve, mixed together dry; seven measures of sand and gravel, if possible of all degrees of fineness, from peas to eggs or stones broken to pass through a 2-inch ring. The finer should just fill the intervals of the coarser materials, then all to be mixed dry and measured. The mixture of cement and lime to be then added and mixed dry, and the whole tempered with as little water as possible. Any more than will just moisten the whole will be in excess. No wall-plates or timbers should be bedded in concrete walls. Concrete should be mixed in small quantities at a time just when it is wanted. "Mason" can easily calculate the cost from the above, if he knows the price of the various materials in his locality.—NEFF.

Health Department's Plumbing Specifications.

WE print here the specifications for plumbing recently adopted by the Health Department of this city:

SPECIFICATIONS FOR THE PLUMBING AND DRAINAGE

of ____ house ____ on the ____ side of ____ street____feet____of____ street ____ owner ____ address____architect____address____ plumber ____address.

Pursuant to the provisions of chapter 450, Laws of 1881, the accompanying plan for the plumbing and drainage of each of the above mentioned houses, and the following description thereof, is hereby submitted for the approval of the Board of Health, the undersigned hereby agreeing to cause the work to be done and the material to be furnished in accordance therewith, with such modifications as may be required by the Board of Health.

The plumber will furnish all materials and perform all labor requisite and necessary for putting up and completing all the plumbing work in a good and thoroughly workmanlike manner, according to the drawings and these specifications.

Where the specifications vary or conflict with the drawings, the contractor is to be governed by the specifications

The plumber will send notice to the Board of Health when the work will begin.

All materials must be of good quality and free from defects.

The arrangement of soil and waste pipes will be as direct as possible, and, wherever practicable, the drain, soil, and waste pipes, and the traps, will be left so that they may at all times be readily examined and repaired. Where they are necessarily placed within walls or partitions they shall be covered with face boards fastened with screws, so as to be readily removed.

To obtain and pay for all necessary permits, and to comply with all corporation laws relating to the erection of buildings

To excavate and insert tap in street main, if necessary.

To connect tap and house supply at point indicated on the plans by____inch____lead pipe, to weigh____per foot, to be laid____feet below curb level.

To place a stop-cock at____to shut off the water when necessary.

To grade each line of supply pipe so that it can be completely emptied at its lowest point.

For each house to make a separate connection to sewer in street, by____inch cast-iron pipe, run at a uniform grade to a point just inside of cellar wall, where set a____inch cast-iron running-trap, with hand-hole for cleaning, with a cover properly fitted and the joints made tight with____cement; the trap to be provided with a fresh-air inlet on the house side thereof, of____inch cast-iron pipe extending to____.

To continue the house drain____inches in diameter along the cellar wall from trap, or in a trench cut at a uniform grade, walled up on the sides, and provided with movable covers and having a hydraulic concrete base of four inches in thickness, on which the pipe is to rest, to the point shown on the plan, giving it an even fall to the trap of____inch to the foot. To make necessary changes in direction by curved pipes, and all connections by Y branch pipes and one-eighth bends. From the point shown on the plan, branch pipes to be connected with the drain pipe to receive the soil and waste pipes, the rain-water leader, and the connections from the area, cellar, and yard cesspools.

For each water-closet or line of water-closets, to provide and set____inch cast iron soil pipe____connecting with the house drain by a Y branch, extending two feet above the highest part of the roof or coping. If near a light shaft____feet. The soil pipe____ to have branches to receive the traps of the water-closets on each story.

To provide and set, with proper connections for each basin, bath or sink, urinals, wash tray, safe and tub____inch cast-iron waste pipe____connecting by a Y branch with the house drain, and terminating above the roof in the same manner as the soil pipe. To connect each of the set fixtures with the waste pipe by a short length of____inch lead pipe with____inch trap.

All connections to be by Y branches.

To set for all water-closets within the house____inch cast-iron vent pipe, connected beyond the water seal of the trap, extending above the roof in the same manner as the soil pipe, or connected with the soil pipe above the highest fixture.

For all other traps to set____inch cast-iron vent pipe, connected beyond the water seal of the trap, extending above the highest fixture, and there connected with the waste pipe, or extended above the roof separately, as the architect may direct. If the latter, the diameter will be enlarged to four inches from just below the roof upward.*

All air pipes to be so graded as to discharge water collected by condensation.

All iron pipes to be sound, free from holes and other defects, of a uniform thickness of not less than one eighth of an inch for a diameter of two, three, or four inches, or five-thirty seconds of an inch for a diameter of five or six inches. Before they are connected each pipe to be thoroughly coated inside and outside with coal tar pitch, applied hot, or with some equivalent substance satisfactory to the Board of Health. To be firmly secured in position by____

To caulk all joints in iron pipe with picked oakum and molten lead, and made impermeable to gases.

Before any of the iron pipes are covered all the openings to be stopped, the pipes filled with water, and, if required, allowed to stand twenty-four hours for inspection. If preferred by the Inspector from the Board of Health, the peppermint test may be substituted.

If any leak is discovered, the joint may be made tight or the defective pipe replaced.

To make all connections of lead with iron pipes by brass sleeves or ferrules of the same size as the lead pipe, set in the hub of the branch of the iron pipe, and caulked in with lead; the lead pipe to be attached to the ferrule by a wiped joint.

Connections of lead pipe to be made by wiped joints.

To firmly secure all lead pipe with hard metal tacks and screws.

To trap every water closet, sink, basin, wash-tray, bath, and every tub or set of tubs effectively, in the manner shown on the plan; the traps to be as near the fixtures as practicable.

The exit pipes to fixtures to be provided with strong metallic strainers.

All set fixtures to be underlined with sheet lead of____pounds per foot, with edges turned up at least____inches, in a secure manner, to prevent overflow. To provide for each safe a____pipe, discharging either into an open sink, or upon the cellar floor, or outside the house, as the architect may direct.

The waste pipe from the refrigerator to be so arranged as to discharge into the most convenient open sink. In no case shall it be connected directly with the soil or waste pipe or the drain or sewer, or discharge upon the ground.

Each water-closet or group of water-closets to be supplied with water from a special tank or cistern, the water of which is used for no other purpose. In no case shall a closet be supplied direct from the Croton supply pipes.

The overflow pipe from each water-closet tank to discharge into an open sink or into the bowl of the water-closet, as the architect may direct. In no case shall it discharge into the soil or waste pipe or into the drain or sewer.

If the pressure of the Croton is found to be insufficient to supply any water closet tank, provide and set up a____pump____

To supply and set up in complete working order the following fixtures of the pattern and kind hereinafter described:

	Basement.	1st Floor.	2nd Floor.	3rd Floor.	4th Floor.	5th Floor.	6th Floor.	7th Floor.	8th Floor.
Water closets									
Urinals									
Wash Basins									
Bath Tubs									
Wash Trays									
Sinks									
Refrigerators									
Boilers									

Description of urinals____
Description of wash basins____
Description of bath tubs____
Description of wash trays____
Description of sinks____
Description of refrigerators____
Area drain____
Yard drain____
Boilers____
Ranges____
Hot and cold water supply pipes____

* It is not required that every trap shall have a separate air-pipe; several may have branches into one vent, provided that each branch be as large as the waste it serves. It is imperative that every trap should be so ventilated as to prevent syphoning, and to insure a free circulation of air through every foot of the pipe.

Water pipes in exposed places to be packed with mineral wool, properly boxed and cased to the satisfaction of the architect.*

(Signature of Owner)....

A CORRESPONDENT suggests that the market price of bricks should be rated according to their size, weight and crushing strength. He instances two lots of bricks, sold at the same price per thousand. One lot averaged 2¼x3¾x7⅞ inches in size, 5 lb. 2½ oz. in weight, and broke at 5,490 lb. per square inch. The second lot ran about 2¼x4x8¼ inches in size, weighed only 4 lb 8¼ oz, and broke at 3,610 lb. per square inch. The real value of these two lots of brick were obviously very unequal. As our correspondent says, it makes a vast difference to the builder of arch or pier if he calculates on bricks standing 500 tons to the square foot and gets them half as strong: or if he figures on 4,500 bricks per rod of 306 cubic feet, and it takes 5,500. He thinks that every brickmaker should guarantee a certain size, weight and crushing strength—which they will probably do when (and not before) builders refuse to purchase bricks which fall short of a stipulated standard of size and quality, or make their contracts with the brickmaker or dealer contingent, as to price, upon the character of the materials delivered.—*Scientific American.*

REVIEWS OF TRADE LITERATURE.

We deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

Hints for Painters, Decorators and Paper Hangers being a selection of useful rules, data, memoranda, methods, and suggestions for house, ship, and furniture painting, paper hanging, gilding, color mixing, and other matters useful and instructive to painters and decorators. Prepared with special reference to the wants of amateurs by an old hand. Industrial Publishing Co., New York. Price 25 cents.

This is No. 3 of the useful series of *Work Manuals* this company are publishing, and it will fully sustain the good reputation the previous issues obtained. The little work gives a description of paints, how to mix them, to obtain the various tints and colors, and how to apply them to obtain the best results. The work also contains rules for measuring and estimating painters' work; also some excellent advice in paper hanging and the selection of wall paper. Taking it altogether, we may safely say that we have not seen for a long time such a useful selection of special information offered at so low a price.

The type, paper, printing and general get up of the *manual* are also deserving of notice, for their clearness, good quality, and common sense display of these subjects set forth.

Our Factories, Workshops and Warehouses: Their Sanitary and Fire Resisting Arrangements. By B. H. Tuwaite, C. E. Published by E. & F. N. Spon, 446 Broome street, New York. Price, $3.50.

This work, though written more particularly for English than American readers, contains many things that builders and designers of large workshops should become acquainted with. Indeed some of the methods and appliances shown for ventilating large buildings are such as every one having anything to do with structures where large numbers of people are employed, should make themselves thoroughly acquainted with. Several chapters of the work are devoted to fireproof building, and contains much that is valuable and suggestive on that subject, and much that could be made to do service in this country.

The work is amply illustrated with good clear cuts, and the descriptive matter is simple, and almost devoid of technicalities and building formula. It is printed on heavy paper, well bound, and handsomely gotten up.

Circulars of Information of the Bureau of Education—No. 1, 2, 3, 4 and 5 for 1881. Issued by the Department of the Interior, Washington, D. C.

No. 1 gives a number of plans and illustrations of library buildings, and the text contains some very useful hints and suggestions regarding the construction of buildings designed for books, records, &c., &c. No. 2 contains a very able paper by E. E. White, L.L.D., on the "Relation of Education to Industry, and Technical Training in American Schools." Those interested in technical education should apply to the member of Congress for their District for copies, as we believe each member can obtain a limited number.

Artistic Homes in City and Country being a selection of sketches prepared in the routine of office-work, and now amplified and enlarged by Albert W. Fuller, architect. Jas. R. Osgood & Co. publishers, Boston, Mass. Price, $3.50.

The work contains forty-four full page illustrations and explanations, showing elevations, plans, perspective views, and interiors of a number of high and low priced "Artistic homes." For those about to build, and who have not decided on any given plan, this new work will be found a great aid, as some of the designs shown are extremely pretty, and what is better, the plans are all that could be desired in the way of convenience and adaptability to the wants of the owner.

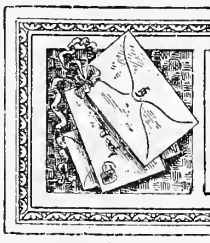
The Journal of Decorative Art—An illustrated technical journal for the house painter and decorator, and all art workmen. Published monthly, in Manchester, England. Price, $2.50 per year, prepaid.

We beg to call the attention of those of our readers who are interested in house decoration to this excellent and ably conducted journal. Each number contains four full page tinted illustrations, showing examples of stencil work, wall finish, cornices, ceilings, dados, window linings, and many other things. Sometimes a full page colored plate is issued with the work, showing an interior or exterior finish in colors.

The February number, which is just to hand, is rich in text and design, and we do not know that we can do better than give the index of that number, to show the character of the journal:

The Journal of Decorative Art Prize Scheme and Competition.
Technical Chapters on the Various Processes Used in the Art of House and Church Painting and Decoration.
Chapter XV.—Decorative Processes.
Owen Jones and his Contemporaries: A. N. W. Pugin.
Short Chapters on the science of Heraldry (illustrated).
On Materials and Tools Used by the House Painter and Decorator: Brushes and Bristles.
Our Illustrations.
Albissima Paint.
Technical Chapters on Graining, Marbling, Sign-writing, Embossing, and Gilding on Glass.
Chapter XV.—Inlaying of Woods.
Measuring-up and Pricing Painting Work.—Chapter 11.
Trade Intelligence.
Answers to Correspondents.

We have made arrangements with the publishers of *The Journal of Decorative Art*, by which we can furnish it to our subscribers, post-paid, for $2. 0 per year. We know of nothing in this line that will suit our decorators better than the journal before us.



CHATS WITH CORRESPONDENTS.

[Any of our readers will be welcome to take part in this Department.]

W. B., of Rockford, Ill., sends us several cuttings from newspapers, giving an account of the invention of the circular saw, and asks us our opinion as to who was the "Simon Pure" inventor of the circular saw. The following are extracts from the clippings sent:

"A writer in the Toledo (Ohio) *Telegram* is authority for the following bit of history: In a lonely secluded spot in the northwest corner of the cemetery near the ever beautiful little village of Richmond, Kalamazoo County, Mich., the reader can find, on a pure white marble slab, nearly concealed from view by a large cluster of lilac bushes, engraved the simple inscription, 'Benjamin Cummings, born 1772, died A. D. 1843.' And who was Benjamin Cummings? He was the inventor of the circular saws now in use in this country and in Europe. Nearly sixty years ago, at Burtonville, N. Y., and Amsterdam, this man hammered out, at his own blacksmith's anvil, the first circular saw known to mankind."

Another, taken from the *Scientific Press* some time ago, is as follows:

"The credit of this invention has been given in some quarters to a citizen of Vermont, now deceased. I think this refers to Wm. Kendall, late of Fairfield, Maine. He died, I think, within the past year. As long ago as I can well remember - perhaps about the year 1825—he built a circular saw mill at Waterville, Maine. His first saw was seven feet in diameter, built of plates of iron, riveted together at right angles, being made thin at the outer edge, but about six inches thick in the middle, where it fitted the arbor. It was made plain on one side and conical on the other, so that the board had to be sprung from the saw as it was cut. It could therefore only be used in cutting thin stuff. The teeth were fitted to the outer edge of the saw, something as the saw manufacturer Emerson now fits teeth. To steady the saw, he built a powerful force pump to throw a very small jet of water on the opposite sides of the saw. He afterwards either rebuilt or enlarged his saw to nine feet diameter. It was driven with a wheel of his own invention, with a half cross belt from a drum on the upright shaft."

Another, also taken from a scientific paper, says: "One Samuel Miller (England), in 1777, took out a patent for circular saws, and describes in his patent the method of driving the saw by a rope or a chain over pulleys, and a feed-table, with a compound motion to direct the pieces against the saw, agreeable to any line wanted to be cut."

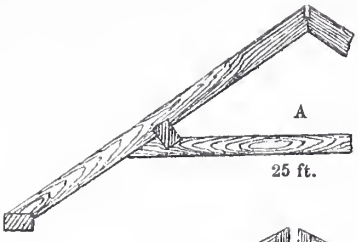
Again, there was standing in 1852 a workshop in York street, London, England, which contained wood-working machines made from designs of Samuel Bentham, in the early part of the present century. These were constructed machines for "all general operations in wood-work, including, planing, molding, rebating, grooving, mortising, and sawing." It is not stated whether the sawing was done with a circular or other saw, but it is presumed it was a circular saw that was used, as it is well known that Samuel Bentham understood the use and management of circular saws. All we can say to W. B. is, that none of the parties whose names appear in the foregoing extracts, were the inventors of the circular saw. The circular saw was known for ages before any of these supposed inventors existed; in fact, there is reason to believe that circular saws, of some sort or another, were discovered and used simultaneously with the discovery of the turning lathe; at all events, Dr. Hooke gives a description of circular saws used during his day for cutting the teeth of clock wheels and for other purposes. The saw, as we now know it, was brought into general use by M. J. Brunel, C. E., for making ships' blocks, and adopted by the British Admiralty Board, in Portsmouth, in 1804. The name of the original inventor of the circular saw is lost in the long, long past. The improvers names are many, and of recent date.

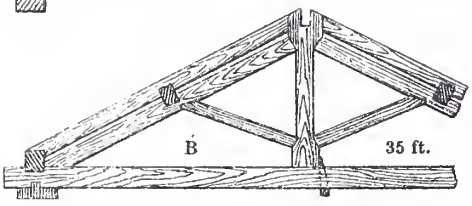
R. P., Portland, Maine.—We do not know of a better way of making a mahogany stain than to rub the surface first with a diluted solution of aquafortis; then 1 oz. of dragon's blood being dissolved in a pint of spirits of wine by seasons the perfect appearance of mahogany. When the polish diminishes in brilliancy it may be speedily restored by rubbing the article with a little linseed oil. All polishes are used much in the same way. If your work be porous, or the grain coarse, it will be necessary, previous to polishing, to give it a coat of clear size; and when dry gently go over it with very fine sand paper; the size will fill up the pores and prevent the waste of the polish, by being absorbed into the wood, and be also a saving of considerable time in the operation. The true French polish is made by bruising a ¼ oz. of gum copal, ¼ oz. of gum Arabic, and 1 oz. of shellac, sifted through a piece of muslin. Put the spirits and the gum together in a vessel

* In the form issued by the Board blank spaces are left between paragraphs to be filled out in writing by the architect for each particular case.

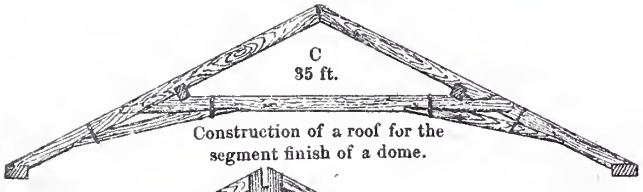
PLATE No. 32

EXAMPLES OF ROOFS.

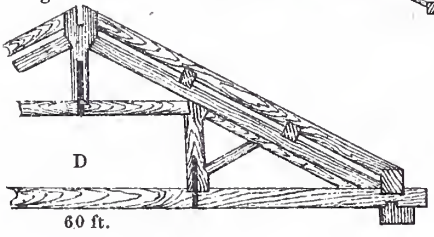


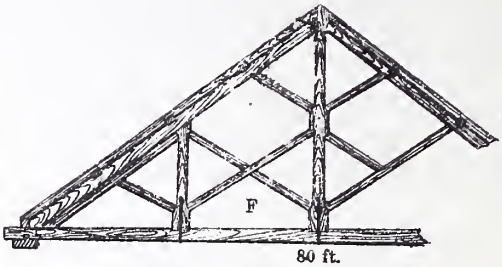


Truss roof.

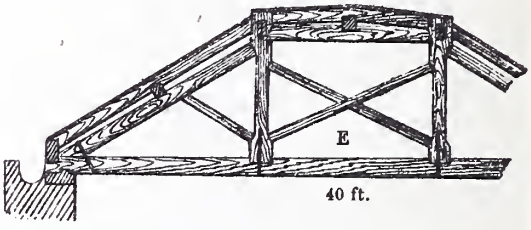


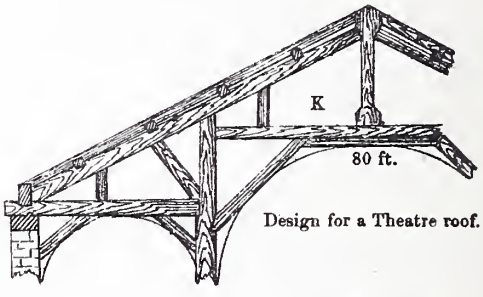
Construction of a roof for the segment finish of a dome.



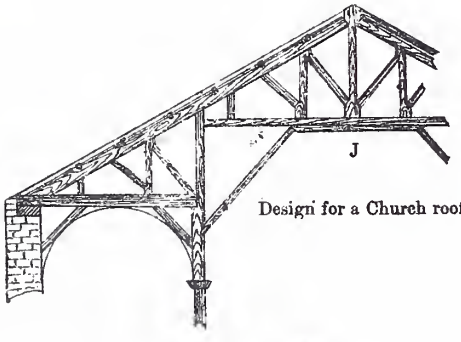


Design for a Theatre roof.

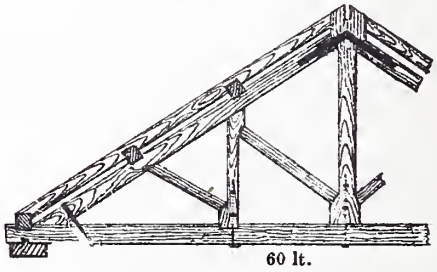


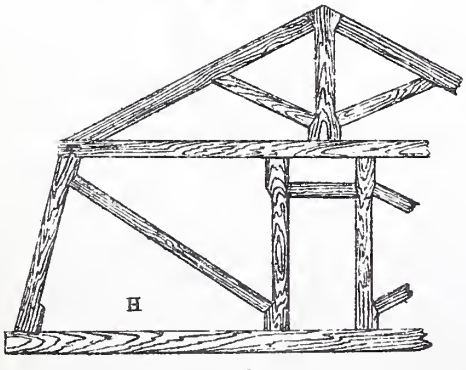


Design for a Theatre roof.

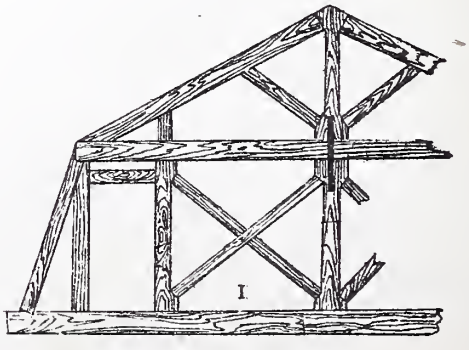


Design for a Church roof.





Curb roof with door at side.



Curb roof with door in middle.

that can be closely corked, place them near a warm stove, and frequently shake them; in two or three days they will be dissolved; strain it through a piece of muslin, and keep it tightly corked for use. You can mark your tools by coating them over with a thin layer of wax or hard tallow, by first warming the steel and rubbing on the wax warm, until it flows, and let it cool. When hard, mark your name through the wax with a graver, and apply aquafortis (nitric acid); after a few moments, wash off the acid thoroughly with water, warm the metal enough to melt the wax, and wipe it off with a soft rag. The letters will be found etched into the steel.

E. D., "Hub," Mass., who seems to have a humorous side to him, sends the following in reply to the "pome" we published last month:

NON-AESTHETIC TO "THE AESTHETE."

I have no love for muddy greens,
Or sombre, dingy yallers—
I yearn not for the "Brotherhood,"
Those limp and languid fellers.
I have no taste for platitudes,
Give me language plain and easy,
A truce to your humpbacked attitudes
And attempts to be "Japanary."
I would not pose a jug or fan
Upon my useful mantelpiece,
For the sake of showing all my friends
That I've something essentially "Japanese."
I hate a room all sombre hued,
Sick with the odor of the lily,
And I vote all long-haired humpy ways
As unmanly, weak and silly.
I'd rather be a "solid man,"
With backbone straight and sturdy,
Than to lay on a bank of Asphodel,
And talk in language vague and wordy,
Of visions rare, and deeply yearn
For unknown things that cannot be.
This every day world as it jogs along,
Is a good enough world for a chap like me.

As we have some acquaintance with the writer of the foregoing doggerel, we beg to say to our readers "that we don't believe he's the kind of a "feller" he says he is—that's all.

H. W. R., of South Bend, Ind., wants to know where he can procure WATER GLASS, such as we described in our December number. Will any of our readers that know, give him the information he asks for?

J. D. M., Rochester, N. Y.—Riddell's New Elements of Hand-Railing is the work you want. Price $7.00. "Gould's American Stair Builder," is an excellent work, and would do you good service. Price $3.00. No work on "Hand-Railing" will teach you the art of making correct handrails, without you diligently apply yourself to studying the art in earnest. With regard to "Gwilts' Encyclopedia of Architecture," we may say that there is no work on the subject, in any language, that gives so much practical information in the plainest style, as it. It is costly, however, too costly for the operative workman to indulge in. We are hoping for a cheaper edition, say one that will be sold for about $8.00. The price is now from $18 to $30, according to the binding; second-hand copies are very scarce.

W. S., Varna. Ill., is in trouble, and wants some reader to help him out. He would like to get a rule for obtaining the cut of a planseer for a hanging cornice, at the corners. He has tried the rule given on page 28, of "The Steel Square and its uses," but cannot make it work. He has also tried the rule for "hopper cuts," but has failed to get satisfactory results. Will some one please give him the required information?

L. E. H., Tintern, Ont., says he is a pretty fair draftsman and thoroughly understands the use of drawing instruments. Furthermore, he knows the principles of perspective drawing, but finds difficulties in the way of getting in his details, and would be glad to know what book or books would be most likely to help him in this matter, and also to receive a few hints on coloring.

A. C. Sargent.—We hardly know how to advise you. "You say you have "Palliser's Useful Details," and they do not suit you. We think they are the best details in the market for the price. Perhaps Bicknell's Detail, Cottage and Constructive Architecture, price $10. This work contains a great many details, all drawn to scale. If you want something modern, however, you should procure a copy of "Modern Designs and Details," price $10. This work contains 80 finely lithographed plates, showing new and original designs of dwellings of moderate cost in the Queen Anne, Eastlake, Elizabethan, and other modernized styles, giving perspective views, floor and framing plans, elevations, sections, and a great variety of miscellaneous exterior and interior details of dwellings, stores, offices, etc. Also, a number of designs of low priced cottages, in the various popular styles, adapted to the requirements of seaside and summer resorts, and suburban and country places, comprising drawings by prominent architects of New York, Boston, and other localities, as well as other designs prepared expressly for this work. All elevations, plans and details to scale.

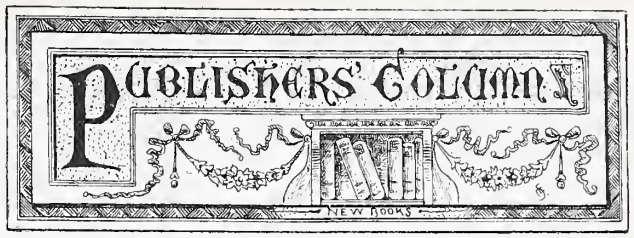
Joseph R., Chicago.—If you make the attempt in earnest you will be sure to succeed. Many amateurs before you have stained and dyed woods successfully. We give you the following rules, which if adhered to will prove satisfactory:

For staining a finished article, which is similar to painting in the manner of its performance, a great variety of receipes are in use. A crimson stain may be made by boiling one pound of Brazil dust for an hour in three quarts of water, straining it and adding one-half ounce cochineal, and finally boiling it gently for half an hour. To give it a scarlet tint, before applying the stain as above made, boil a half ounce of saffron one hour, in a quart of water, and pass it over the surface to be stained. For a green stain, add to three pints of strong vinegar four ounces of verdigris finely pulverized, one-half ounce of sap green and one-half ounce of indigo. For purple, boil one pound of chip logwood in three quarts of water for an hour, after which add four ounces pearl ash and two ounces pounded indigo. For blue, the same process, with the added ingredient of four ounces indigo mixed in a clean glass vial with one pound sulpburic acid. In all these cases the materials used should be of the best quality. The proper method of polishing will depend on the nature of the wood, but in any case rough sand papering would not be advisable.

J. R. K., Detroit, Mich., sends the following which he thinks fully represents some folks ideas anent the æsthetic: "Oh, yes," said Mrs. Brown, as she surveyed with evident pleasure her new parlor sideboard, covered with china and decorated with highly-colored tiles; "Mr. B. remarked last night that I was becoming quite an atheist," and the old lady's countenance fairly beamed with delight as her eyes rested on a 25-cent Japanese vase. The old lady had got the difficult word "æsthetic" in her mind, but could not get it on her tongue.

"IT is all very well to admire a pretty girl in a seal-skin sacque, but when one of those charmingly attired and attractive appearing demoiselles is heard to blurt out, as we heard in Tiffany's the other day, "Oh, ma, ain't them terra firma ornaments just lovely?" our faith is shattered.

IF those of our readers who wish to take "a hand" in this department will kindly mention the fact in their letters, it will save us some trouble and much inconvenience and disappointment to themselves.



☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

WHAT kind of a stationary wash-tub does soap-stone make? Go to Serene's Vermont Soap-stone Works, 310 Pearl street, N. Y., and Mr. Serene will show you satisfactorilly that a soap-stone tub is the very best, being sweet, clean, strong and easily kept in good order. When you want a tub, examine those made of soap-stone before buying any other.

THE hydraulic elevator recently erected by an Eastern firm in the new Philadelphia "Record" building, Chestnut street, above 9th, in that city, not giving satisfaction, they are going to tear it out. After carefully examining the merits of various elevators, Mr. Singerly decided to replace it with a Clem & Morse Elevator of the Albro-Hindley Screw-gear Pattern, with the Henriksen Automatic Safety Clutch, which obviates danger from causes unprotected by other safety appliances.

OPEN fire places are becoming very popular. The "Open Stove Ventilating Co.," of 78 Beekman street, have an air warming grate of two sizes, which is destined to be used very extensively, and is particularly adapted for large apartment houses and French flats. Architects and builders should look them up, as they generally give the best of satisfaction wherever used.

THE saw manufactory in Brooklyn, known as the Vulcan Saw and Tool Works, and carried on by Harvey W. Peace, has been formed into a Limited Liability Company, and will be known hereafter as the Harvey W. Peace Company, limited; with Harvey W. Peace as president and superintendent, and R. R. Franklin as secretary and treasurer. The "Vulcan" brand of saws is so favorably known among mechanics that it is only necessary for us to say that the same supervision and care that have given the saws such a wide reputation will be continued under the new arrangements. This fact, combined with increased facilities for production, employment of first-class workmen, and the use of only the best materials, will insure to the purchasers the best qualities of saws the market can produce.

S. A. RIMINGTON, of 40 and 42 Broadway, New York, and 520 Walnut street, Philadelphia, is prepared to furnish border bricks in one, two, or more colors, and in any quantity. Each brick leaving this firm is perfect in shape and quality, and is profitable to the user, as there is no loss or wasters. A number of very important buildings in New York, and other cities, have recently been erected with these bricks, among which may be mentioned the MILLS BUILDING, Wall street, N. Y.; WALLACK'S NEW THEATER, N. Y.; LOW'S BUILDING, Brooklyn; THE NEW YORK PRODUCE EXCHANGE, and many other buildings of note.

Mr. Rimington also manufactures a building brick of a fine warm buff color, and enamaled bricks in white and colors.

Information regarding styles, colors, prices, etc., given on application.

SPECIAL NOTICE.—We cannot fill any more orders for fifty-cent or thirty-five-cent packages of drawings, as a number of the designs are out of print. Neither can we fill any more orders for "TEN PLANS OF HOUSES FOR TEN CENTS," as this little work is also out of print.

We have prepared a package of designs, which, we think, will meet the wants of many of our readers, and which we have put down at the low price of 25 cents in cash, or 30 cents in postage stamps.

The following are a part of the illustrations the package contains:

A wall-table in Queen Anne style. Mantel and cabinet to be made of walnut.

A handsome dining-room sideboard, in the Eastlake style, to be made in natural woods.

Cottage in Queen Anne style. Estimated cost $3,000, finished in natural wood.

Working-Men's cottage. The house is to be 22x28 feet on the ground. Total cost of building completed, including foundation, $700.

A book-case made of ash.

A side-board made of black walnut.

A library-table, with shelf and draw on each end.

A reading-table, with trimmings of polished brass.

An easel, built of cherry and ebonized.

A wardrobe, in Eastlake and Queen Anne style, the construction being Eastlake's, and the ornamentations being Queen Anne's, made of light domestic wood.

A combined writing-desk and book-case, in Queen Anne style, made of oak.

A side-board of oak or walnut.

A bandsome book-case of ash, or other light wood.

A wall-cabinet of ash.

A book-case and writing-desk, in black walnut, with polished brass trimmings.

A very handsome mantel for a farm-house.

A book-case, to be built of black walnut, with trimmings of polished brass.

An altar and screen.

Side elevation of a square bay-window, built of oak.

A study table and a washstand.

A handsome desk, to be made of walnut.

A mantel, finished in black and gold.

A handsome staircase.

Two designs, one for a picture-frame and a wall-table, made of light, colored, close-grained wood, such as maple or cherry, or birch.

A frame foot-rest, clock-shelf, and music-stand.

Besides these designs, the package contains some examples in Swiss architecture, working drawings for bed-room furniture, solutions of problems in practical carpentry, such as covering solids, hip roofs, backing of hips, etc., etc., together with several plates on hand-railing, and other matter suitable for the practical workman.

Besides all the foregoing, the package contains forty-eight pages of text, descriptive of the designs and illustrations shown, some recipes for working, staining and decorating wood-work, and a large amount of useful matter for the operative mechanic and amateur wood-worker.

The plates, designs and text, are taken from miscellaneous back numbers of the ILLUSTRATED WOOD-WORKER, and are some of the best specimens published in that useful journal.

We send the package, postpaid, to any address for 25 cents, or ten three cent stamps.

ADVERTISER'S INDEX.

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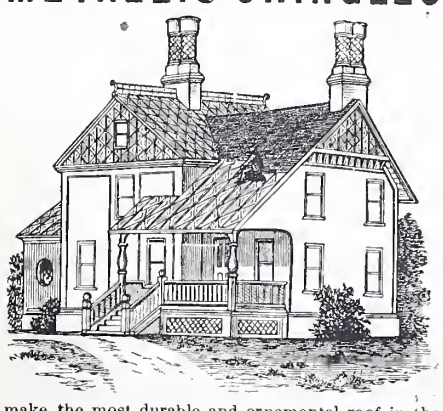

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THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

PUBLISHED MONTHLY,

AT

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CHARLES D. LAKEY, PUBLISHER. FRED. T. HODGSON, EDITOR.

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N. B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, 176 *Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } MAY, 1882. { WHOLE NUMBER, 176 / NEW NUMBER, - 5

AS the great English poet, Pope, has sung :—

'Tis education forms the common mind;
Just as the twig is bent, the tree's inclined:

and we sincerely believe that all readers of the BUILDER AND WOOD-WORKER will indorse the truthfulness of our statement when we declare that our one great object since the establishment of this journal has been to educate, and so to elevate, the American workman—no matter what his class of labor may happen to be. Our task—difficult and delicate—has been, by easy steps to lead the worker on from subject to subject, until he found himself a pleasure in himself, and fit to hold his own against all comers. With the interference of capital, the deleterious influence of the now great power of money-lending, we have not so much to do, as with him who is eventually appealed to for assistance in all the great schemes of capitalists, promoters, and adventurers—the workman. How, up to the present time, we have performed our task, let our volumes reply: more than that, let nearly every letter that ever entered our office speak. Almost unanimously their praise has been most flattering—more, we often think, than is deserved. Stimulated by commendation, tendered in so kind and prompt a manner, we have secured the very best talent to be found in all the departments we represent.

We have had, and still have among our numerous readers, men who are practically engaged in engineering, civil and mechanical, and who find a pleasure in assisting through our columns, these who are struggling upwards from the lower walks of life. But notwithstanding all our endeavors we yet require a little friendly co-operation. It is our wish that every wood-worker in the United States and Canada should have on his table at night a copy of the BUILDER AND WOOD-WORKER; and this wish of ours may soon be fulfilled by the combined assistance of our numerous subscribers, amongst whom we may number many thousands of foremen of works, draftsmen, architects, decorators, cabinet-makers, carpenters, joiners, masons, bricklayers, painters, turners, and many others who are interested in beautifying their homes, or who take delight in amateur wood-work. We beg, then, that each subscriber introduce our paper to the notice of his friends and brother workmen, and so, by steady extension of its circulation, endeavor to extend the benefits of literary—of educational co-operation to all who are concerned in building or wood-working. We simply defy any existing journal to show such an useful table of contents as our own month after month; and the knowledge of this emboldens us, and will embolden us again, to call upon all who support us now to invite others into their ranks. We have long entered upon the good work, and, unaided by any corporation have succeeded in carrying forward a national undertaking; but we need more aid, and finding such to be the case, appeal boldly to our subscribers. We give money's worth for money; and can therefore confidently, heartily, and independently ask their aid in the object we have in view—the increase in circulation of the cheapest and most useful publication of the day—THE BUILDER AND WOOD-WORKER.

NO greater mistake can be made by a person who is going into some manufacturing business, than to buy poor machinery because it is cheap. A contemporary, in speaking of machinery "cheap and nasty," makes the following very sensible remarks:

"There are plenty of people who are always looking after good articles, but they do not want to pay a good price for these articles when they find them. They seem to be oblivious of the truth that good things cost money, and that the best class of labor and material is required in turning out superior productions.

A man starts out to purchase a piece of machinery ; he wants it to do perfect and exact work, he wishes it to have the latest and best improvements, and to be capable of turning out work with rapidity. Such machines of course can be procured, but not for a mere song.

Many and many a manufactnrer has congratulated himself on his shrewdness in saving a few hundred dollars in purchasing machinery, who has, in fact, lost thrice the sum saved in the difference in the effectiveness of the machinery which he did buy, and that which he could have procured by paying the higher price.

Any good mechanic will verify the assertion that machinery which is constantly getting out of order, and that never does accurate work, in those cases where accurate work is uceded, is dear at any price ; and yet there are plenty of shops and factories fitted out with just this kind of machinery, which was purchased because it was cheap.

There can be no objection to a man setting out to buy poor machinery at a poor price, if he knows what he is buying, but it is extremely foolish for him to buy a cheap and poor article with the belief that he is obtaining a good one."

SURELY, and not slowly either, are American inventions and improvements pushing their way into the older countries of the East? Recently it was proposed to introduce American grain elevators into use in the port of Havre; a committee, composed largely of American residents in France, have been formed for this purpose. It is curious that so important a seaport as Havre, where enormous quantities of grain are received annually, should be destitute of the simple and well-known method of handling grain, such as is afforded by the elevator, but this is the fact, the only mode of transfer being the primitive one of carrying on men's backs, and the grain is left in heaps upon the quays, exposed to loss by weather and by theft.

Hungary, Austria, Russia, and that cradle of all the arts —Egypt, are also moving in the matter of elevators, and lastly we have rumors of a company being organized in Australia for the purpose of erecting elevators on some point of the sea coast, near some of the grain-growing localities. All this indicates that American ingenuity is becoming recognized all the world over.

THE practice of hanging pictures so that the top shall overhang, is a question of position and light. When the light falls full upon a picture, whether a varnished oil painting or a framed engraving or water-color, there is a glare of lightness which prevents the whole of the picture from being seen. This is a common case, and the only means of avoiding it is to let the picture hang out from the top so that the whole of it can be seen from any part of the room without this objectionable light upon its surface. This is effected by placing the rings of the frame low enough down to cause the picture to have the desired inclination. It is a good plan when about to hang the pictures in a room to make a sketch of the proposed arrangement, previous to commencing hanging. This saves much after labor and vexation. The largest picture should always have a central position, so that those of a less size and form can be symmetrically grouped around it. The eye will be satisfied by such an arrangement. The character and form of the frames is a very important factor in the question. Engravings and water-color paintings should always have a broad margin to the mount, and a narrow light frame. The margin serves to isolate the painting or engraving, and thus enables us to see its beauties to much greater advantage. This is more especially the case if the wall upon which they are hung, has a pattern upon it. These frames should be alike in make and breadth as far as possible. Oil paintings require a different and a much heavier frame than water-colors and engravings. The principal object in both cases is to display the painting to the best advantage. The broad margin does this with water-colors, but the oil painting having no plain margin we must depend upon the frame to effect its isolation. In our opinion a great mistake is made in having these frames too elaborately ornamented. It is not the frame we wish to exhibit but the picture, therefore anything tending to lead the eye from the subject is an error. The frame surrounding an oil painting should be broad and comparatively plain, as we thus separate and confine the picture so that the eye takes in the whole of it without being confused or interfered with by any external object.

NEWS of labor strikes, and rumors of intending strikes come to us from all parts of the United States and Canada. The same old cry of arrogant capital and oppressed labor is heard again from Dan to Beersheba. When will this eternal conflict between capital and labor cease? Surely, with all the experience of past ages, the accumulated knowledge of centuries, and the existing abundance of all good things, some means might be devised by which labor and capital could be induced to pull together in unity.

In former times, when a strike occurred, public sympathy generally went with the employer, because it was given out that the workman was ignorant and knew nothing of the laws of "supply and demand." It cannot be said of the workman at this day that he is anymore ignorant than many of the employers. If not able to split a hair on the question of "supply and demand" he, at least, knows that prices are higher for the products of his hands than they were some time ago, and that he eats as much now as he did, and that his wants are no less, while everything he requires for himself and family has advanced in price from 5 to 50 per cent. He knows this, and while he is working harder and getting poorer, his employer works less and is getting richer.

That capital should receive its fair reward, no sensible person will deny—but what is its fair reward? Aye, that's the question! Shall it be 10, 20, 30, 50, or a 100 per cent on its outlay, per year? True, capital is not to blame in all cases. Workmen are often rash, and many times strike when the time is unpropitious, and when they themselves are unprepared.

Workmen should remember that "nothing succeeds like success."

Sooner or later the great battle between labor and capital must be fought out. How long is it to endure that, whilst the master pockets a dollar, the workman only gets a cent? How long will it last that, whilst the former are heaping up large fortunes daily, the latter are no better off at sixty than they were at thirty? How long shall the workman be told that because trade is dull *his* wages must be reduced, and, at the same time, the income of his employer is undiminished? True, the latter will argue that as he and his family, his wife, daughters, sons, etc., have been accustomed to all the luxuries of life, they cannot forego a single one—nay, not even a silk dress, or a Parisian fashioned bonnet. But the bread of the workman's children must be stinted nevertheless.

Strikes, as a rule, do not benefit the workman financially. The loss of a few weeks' work is generally greater than the subsequent advance, if the strike is successful. But it is a heroic protest against the grinding tendencies of unscrupulous capital; and whatever may be said of the wisdom displayed in striking, nothing can be said against the right to strike, or the heroism of the men who take part in the movement.

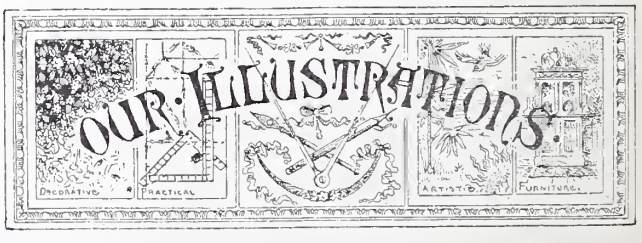
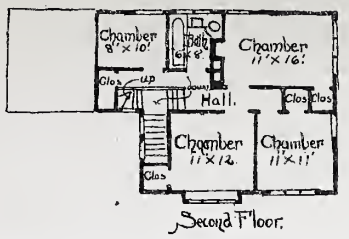
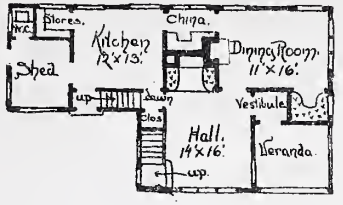


PLATE 33 shows the design of rather a quaint looking cottage, but one that is picturesque nevertheless. The estimated cost of the building complete is put down by the architect, at $1,500. This estimate is made for the neighborhood of Boston. For the money we think it a very cheap cottage.

PLATE 34 exhibits front and side elevations of a cottage recently built near Grand Rapids, Mich. The whole house cost complete without plumbing $1,800. The cost of plumbing would probably amount to something like $200, thus making the house complete for a total of



Second Floor.



First Floor.

Design for a small Cottage.
Ralph Wm. des et del.
Cost $1500. 83 Devonshire St Boston Mass.

Cranedel.

$2,000. The building has a very neat and artistic appearance, and when its total cost is considered, it will be found that every detail has been well thought out.

The design is by David S. Hopkins, Grand Rapids, Mich.

PLATE 35 shows the first and second floor plans of the cottage shown on the preceeding plate.

ON PLATE 36 we show a very handsome mantel for a dining room, with overmantel all complete.

The design is by Edward Dewson, of Boston, Mass.

PLATE 37. This is another of those useful plates, BUILDER AND WOOD-WORKER, Helps to Amateurs' series. The clock case and details are all drawn to scale, and can be readily understood by the amateur workman. Further explanations are unnecessary. The plate is by Mr. Edward Dewson.

PLATE 38 exhibits an inexpensive dining-room suite. It is sufficiently plain and simple in construction to come out at a moderate price. The hand holes in the tops of chairs may be left in, or otherwise, at pleasure. They certainly are a great convenience in the handling of a stuffed back dining-room chair. All the furniture woods are now used for suite making and may be applied in this case.

ON PLATE 39 we show a design for dado and frieze in Anglo-Japanese style. The design is by Luther Hooper, and is reproduced from the *Cabinet Maker and Art Furnisher*. The design is for a staircase dado and frieze, and shows the effective use that can be made of Japanese details if properly arranged. One advantage of this dado is, that it can be made of any height, and may be hung on the rake of the staircase without the waste that occurs in designs which need matching at the ends. Similar designs to this may be found in many of our large wall paper establishments.

ON PLATE 40 we show a plan for a cremation furnace. The lower portion of the plate shows a perspective view of the building in which the furnace is placed.

The design is by Stanton M. Howard, architect, Wheeling, W. Va.

Mathematics for Mechanics.

THE saying that practice makes perfect, implies that something else is wanted besides practice; something which practice crowns and completes. That something is theory or a knowledge of the principles on which the practice is based.

Mechanical operations draw largely on the various departments of mathematics for their principles. Arithmetic, algebra, geometry and the calculus are constantly levied upon and often taxed to their utmost to supply the demands of mechanics. And these demands are sometimes so tremendous that even the vast resources of modern mathematics cannot satisfy them. The drafts of the physical on the abstract sciences frequently resemble what is known as "a run on the bank," when the funds run out and the bank has to close its doors. In other words, physical problems are constantly arising that baffle the profoundest mathematical analysis.

But while it is not necessary or possible for every one to be a great mathematician, every mechanic may get a vast deal that is needful for him from the field of mathematics, and that not very abstruse or difficult; and the mechanic who is wholly ignorant of mathematics is like a blind man groping his way. He may tread with confidence a familiar, well beaten path, but the moment he swerves in the least from it, in any direction, he is at sea. If a mechanic would not wish to be a mere automaton, he should be acquainted with the following subjects:

1. *Arithmetic.*—This is learned by every one at the common school; but in after life, without practice, its rules and processes easily slip from memory. Everybody, of course, should be familiar with the four common rules—addition, subtraction, multiplication and division—and there are certain other rules that a mechanic especially should be at all times up in. He should be perfectly at home in both vulgar and decimal fractions and be able to handle them like an expert. He may often have occasion to extract square and cube roots, and should be able to do so with facility.

2. *Mensuration.*—Every mechanic should know how to measure and calculate the areas of common plane figures, particularly those of the triangle and circle. He should also know how to measure and compute the surfaces and contents of the commonest solids, as the parallelopiped, pyramid, cone, cylinder and sphere.

3. *Algebra.*—He should know as much of algebra as to be able to solve simple and quadratic equations. He should also be able to use the binomial theorem. And especially he should be thoroughly familiar with algebraic formulæ and transformations, as he will constantly meet them in books if he attempts reading; and he should be able readily to calculate the value of any expression when the letters in it are assigned numerical values.

4. *Logarithms.*—Without necessarily being acquainted with their theory and construction, he ought to be able to use a table of logarithms.

5. *Geometry.*—A knowledge of the principal properties of plane figures would be highly useful. Also an acquaintance with the geometry of the most familiar solids, as the cylinder, sphere, &c.

6. *Trigonometry.*—The meaning, at least, of the terms sine, cosine, tangent, &c., should be understood. Also the solution of plane triangles.

7. *The Calculus.*—The differential and integral calculus is the powerful machine with which mathematics achieves its greatest wonders. It is commonly treated as something too lofty, too sublimated to be within the comprehension of ordinary people. This is a mistake. The radical and essential ideas of this great two-fold calculus are easy of comprehension, and while it covers an illimitable field, there are parts of it—and those the most useful—that can readily be mastered by any one with a very small stock of algebra and geometry at command. No mechanic with such a moderate equipment need dread the calculus. He can acquire some of its best formulæ with ease, and bear in mind that the date is not an essential part of a negotiable instrument. There may be a good bill or note without a date, nor is an instrument rendered void by having a wrong date. What is prohibited by these statutes is not the dating on Sunday, but the making or accepting on Sunday. It is perfectly clear that an innocent holder of an instrument really made on Sunday, but dated on another day, may recover on it. Whether he may recover on a note made and dated on Sunday, when he has no notice of the fact, but might have acquired it by reference to an almanac, does not appear to have been decided, and in the absence of authority cannot be considered free from doubt.

Building in Japan.

IT is now pretty well known that the ancient empire of Japan has recently divested herself of her old social and political vestments, and commenced to array herself in those of a more modern type. She has, in fact, decided to institute and organize Western technical processes and industries throughout the various islands which make up the empire, and to invite experts to assist in the work from Europe and America. There is certainly a vast field thus opening up for the operations of those who choose to venture so far in quest of active employment, and who can carry with them talent, energy and enterprise. This holds good of representatives of every art, science and manufacture at present in existence in Great Britain, and of architects and builders in particular. The general construction of houses in Japan has hitherto been of so primitive a character as to resemble very much that style which prevailed at home some hundreds of years ago. Purely Japanese buildings are generally, and almost without exception indeed, built of wood. Even the checkered tile and plaster constructions with which artists have made us familiar are formed of timber as a base; and this, therefore, serves as a support merely to the ornamental tiles. The utterly unscientific disposition of materials observable in almost all native structures, and the total absence of braced and trussed framing, prove that their builders were utterly ignorant of the first principles necessary to insure the maximum of strength with the minimum of material. They have also ignored the use of diagonal members in their framing, and preferred the rectangular to the triangular division into bays. Some have, it is true, attributed this latter peculiarity to considerations respecting the contingency of earthquakes; but it need hardly be mentioned to our readers that the rectangular is far inferior to the triangular division for insuring rigidity and solidity.

The truth is, in respect to all Japanese edifices as they stand at present, that their designers were innocent of any knowledge of the scientific rules which should govern design and construction, and hence, like some of our own earlier mechanical engineers, they placed too much material in the wrong form, where it was not wanted, and omitted to employ enough where the strain was likely to be greatest.

Then, again, the almost universal employment of wood in the construction of buildings is a mistake, and one which would not long exist if British counsels prevailed in Japan. It is unnecessary to say that the most important conditions influencing the durability of wood in such cases is, its position in regard to atmospheric surroundings. If, for example, it is subjected to alternate moisture and dryness it will soon fall into decay, and no climate is more fickle in respect to rain and sunshine than that of Japan. The Japanese, strangely enough, appear to have paid no attention to processes intended for the preservation of timber, such as injecting

into its pores antiseptic salts. Red stucco or plaster is the only preservation employed, and this is sometimes spread over wood perfectly unseasoned, and perhaps full of sap, the consequences may readily be imagined.

In brief, architecture and building in Japan are not only in their infancy, but scarcely out of their swaddling clothes, and yet the country is rich in every variety of material for adaptation and development in those decorations.

Planing Mills.

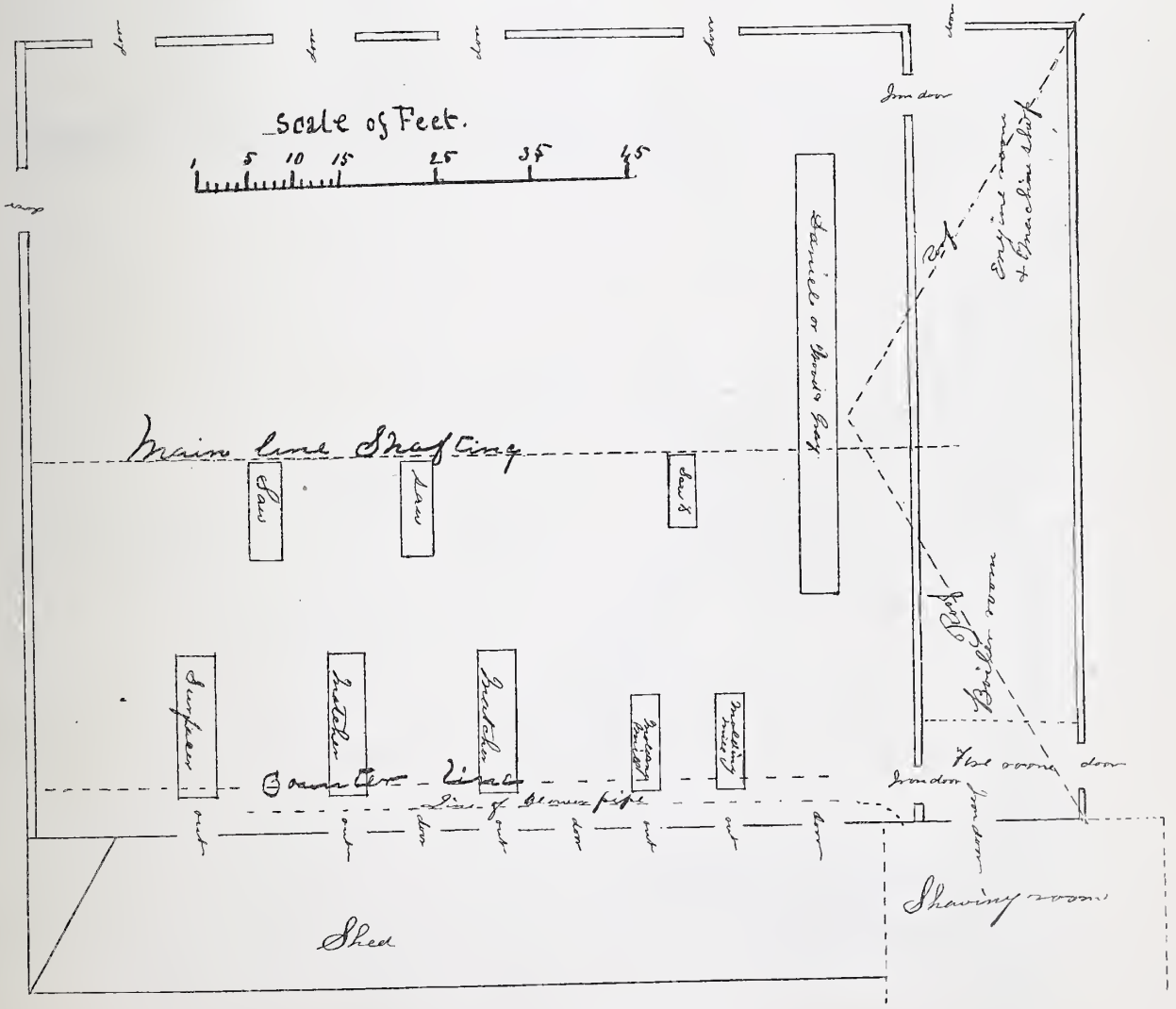
BY J. T. L.

C. N. N. has asked me, or some other clever fellow, to get up a plan for a planing mill. A person might almost as well go to a carpenter and ask him to build him a house without giving him any idea of what he wanted, or where it was to be built, or what he wanted to use it for, for the conditions are so varying that it would be almost impossible to make a plan that would suit every one. Some mills would do nothing but planing, and planing and matching, while others would want to put in turning and band and jig sawing, and make mouldings, and, perhaps, make a few boxes, and so on to the end of the varying requirements of wood working machinery. So I say, there are scarcely two mills built alike that would just satisfy two parties doing business in two different places. Some mills would seldom have a board over 20 feet in length, while another would be having a great deal of stuff 30, 40 and 50 feet, and sometimes even longer than that. But I will do my best for C. N. N., and will suppose he is running, or going to run, a mill with one surfacer and two flooring machines.

In the first place I would say, build on the most level spot you can find, and where you can get to and from your mill without any trouble with all the load a team can haul. And another thing, you want to arrange it so as to handle the stuff just as few times as possible, for it costs money to handle lumber whether in the mill or out. I would put the surfacer on the right hand side of the mill, and as many as eight feet from the side of the mill for this reason: many times just before a storm you have a lot of dry lumber, which you want to put in so that you will not only have something to do in a stormy day, but your lumber will be in good condition and dry. Should you need more room, an open shed alongside the building and opening into it will give all the room you need.

Now 12 feet at least from the surfacer, and on a line with it, so as to belt from the same line of shafting, put a matcher, and 10 feet back of the matcher, and 4 feet to the right, put a rip saw bench so the man taking from the saw can lay his stuff on a horse made by bolting a strong piece of 3x5 on to the matcher, and extending out over the counter three or four feet, supporting the out end of the 3x5 piece so strongly that you can put any reasonable load on it. I have seen some mills with a strong bar of iron held up at the outer end with an iron post. This is a good arrangement, and better than a wooden bar; I would do this so that the man feeding the machine could get the stuff handily and be able to give his whole attention to the mill he is feeding, and not have his time and attention taken up in running after stuff.

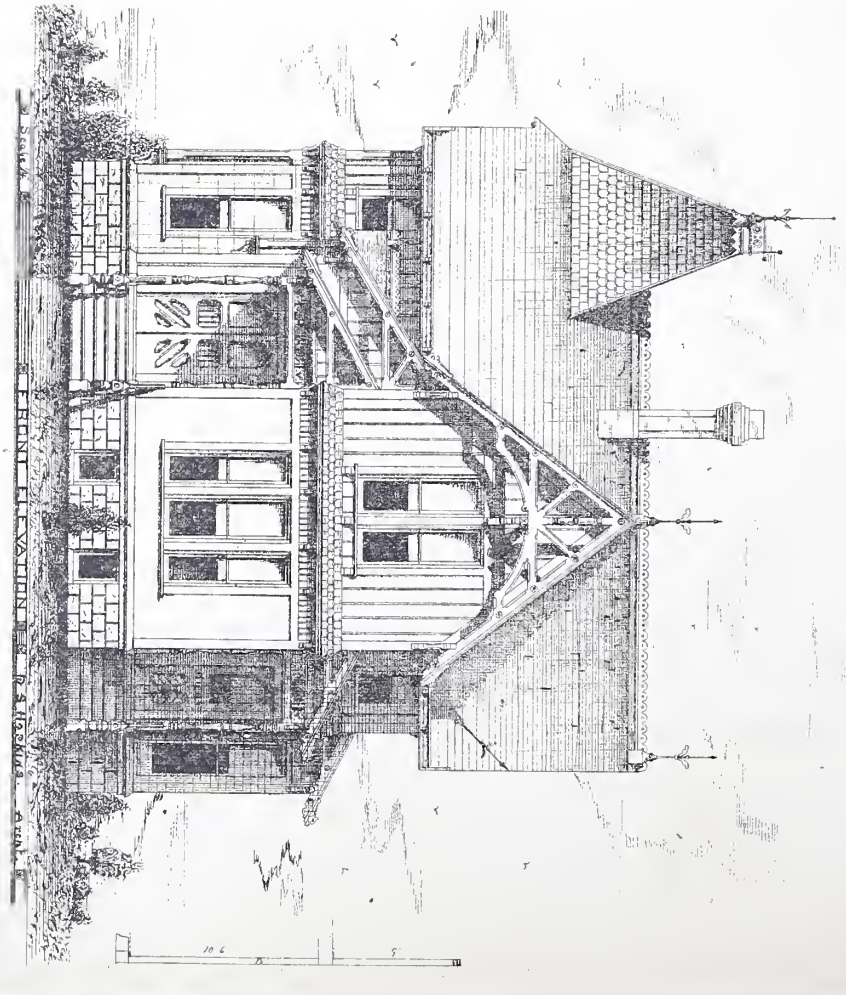
As I have said before, one story is high enough for a planing mill, as I believe it should be entirely separate from anything else, for if connected with any other mill, one or the other will necessarily suffer inconvenience. I have drawn this plan to be used either with or without a basement. If with a basement room, I would put the main line of shafting below the floor on good, firm pillow blocks, and not hung from the floor on hangers, for the reason that if hung up to the floor the load on it is constantly shifting, and the shafting is nearly always out of line. If the main line of shafting is above the floor, I would hang it up as shown in the dotted lines and counter to the dotted counter line at the back side of the mill, for this reason. The whole floor is then clear and no belts in the way of piling stuff anywhere you like. The only possible objection being that the driving belt to the planers will draw from the top of the pulley. Something I should certainly try to get over by put-

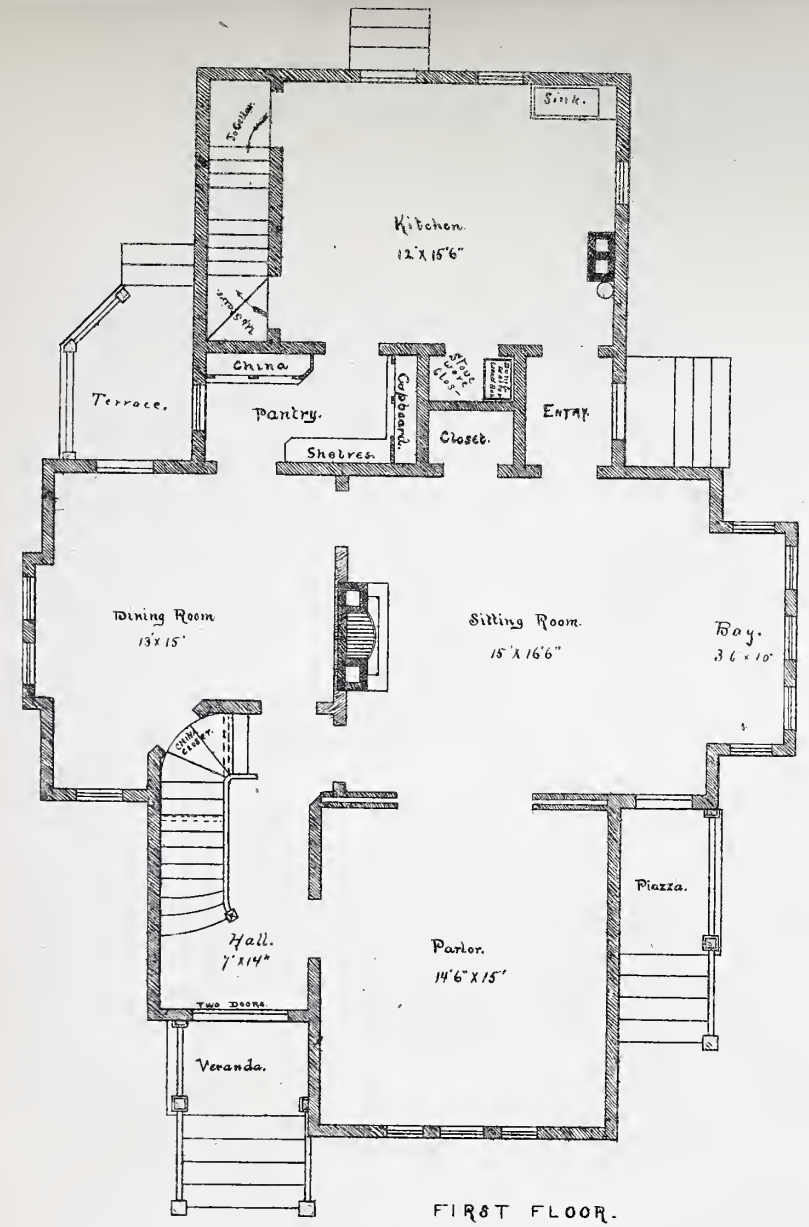


PLAN OF PLANING MILL.

PLATE No. 34


SIDE ELEVATION
D.S. Hopkins, Archt.

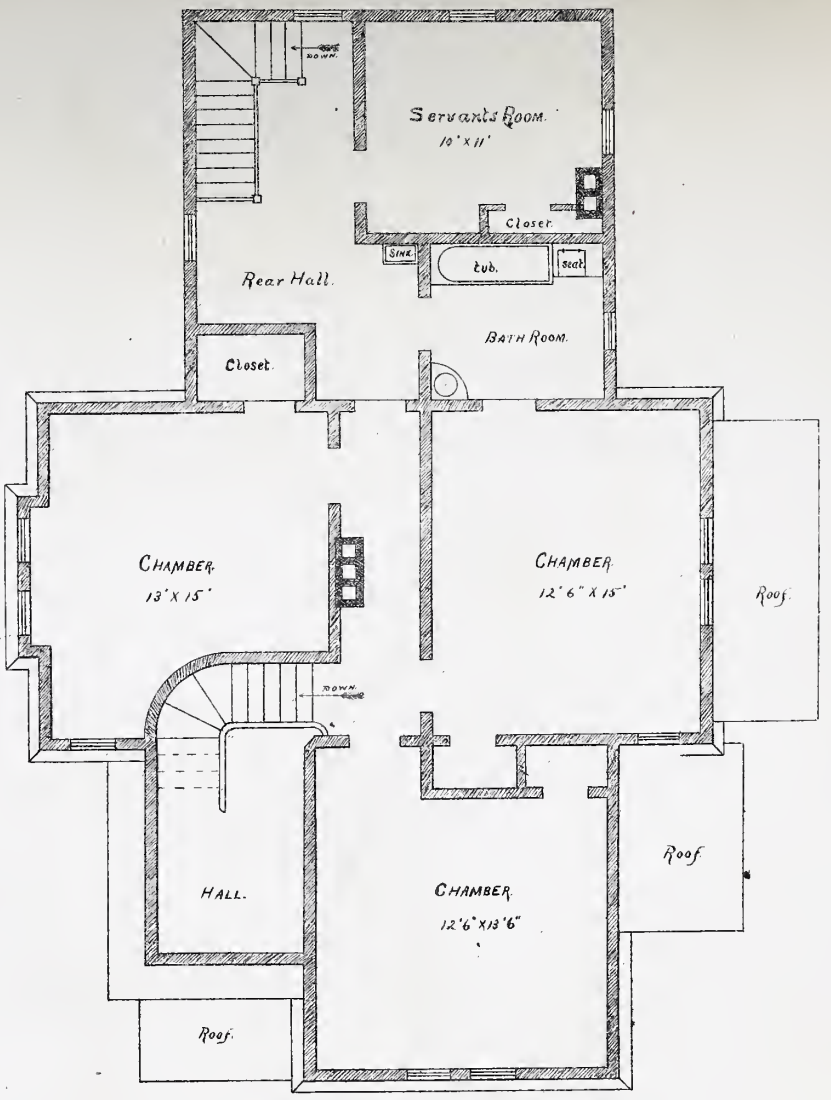

FRONT ELEVATION
D.S. HOPKINS, ARCHT.



FIRST FLOOR.

D.S. HOPKINS. ARCH'T.

GRAND RAPIDS. MICH.



SCALE 1/4"

SECOND FLOOR.

D.S. HOPKINS. ARCH'T.

GRAND RAPIDS MICH.

THE BUILDER AND WOOD-WORKER

PLATE No. 35

ting the main line below the floor so the belt will draw from the under side.

A mill should be built with a first-class truss roof, so that there shall be no posts or anything else in the way of a clear floor the whole size of the mill, and at least twelve (12) feet from top of floor to under side of truss timbers, or 12 feet in the clear. This will give a good length of belt, which is desirable rather than a little short belt. The only objection to having a belt draw from the top of the pulley is that it does not drive a machine as strong as it will to draw from the under side; but, for myself, rather than belt on to a planer, so the driving belt will be in the way, I would have it pull from the top; so I put the counter shaft at the back of the mill in case you cannot belt up from below.

A good basement is very desirable if you can have it, so that water will not set into it. If you do not use a blower for shavings it would be very convenient to drop them down through the floor and have your boiler set on a level with the floor of the basement, and a passageway through to them, and some convenient way of getting shavings to the fireroom. If using a fan for taking away shavings I would use a blower to each machine, because then, by a simple arrangement a blower can be fixed so as to be in motion only while the machine is running. The great objection to using one suction fan for all your work is, it is almost impossible to fix one so that each machine will get an equal share of the wind. I have drawn a shaving or chip room, which should be made large enough to take all your shavings and chips without difficulty, and have plenty of outlet, so that your fans will not choke up. There is more trouble in not having outlet enough to fans than from any other source. I have planned it so that the fireroom opens directly to the shaving bin, and have left the boiler and engine all in one, for the reason that I do not propose to put in the boilers and cannot tell what arrangement may be made for them. For my own taste, I would put in upright boilers to save room. I have said engine-room and machine shop, because I believe every concern of this size should carry a first-class engineer, and one who is a good machinist and can do all the repairs necessary around the mill.

Now for the roof, which I have said should be a good truss roof, and well lighted. If there is anything in the world I believe in, it is plenty of light in a planing mill. Put a good, generous skylight over each planing machine, another over the molding machines, and put a good supply of skylight in the opposite side of the roof.

I believe brick to be the best material to build a mill with, put good, thick, solid walls on a good solid foundation, and if you have a basement room, put in good solid floor timbers, so that you can put as much load on it as you want, without fear of its breaking through.

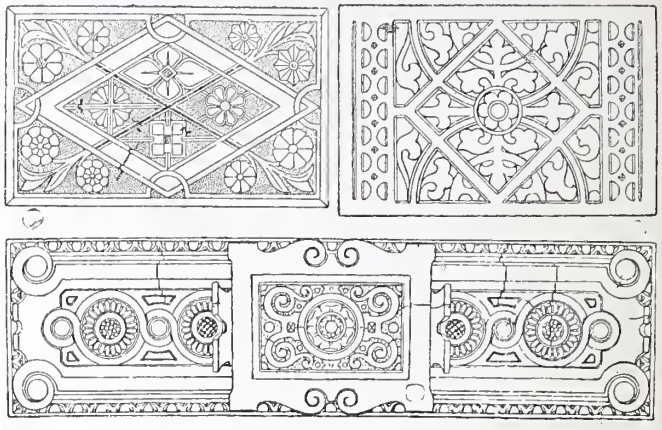
Now, if C. N. N. does not want as much machinery in his mill as I have put in, he can cut off any piece he chooses. I have made room for a Daniel's or Gray & Woods planer, for I believe every mill ought to have one or the other in it. I have left the machines four feet from the side of the mill, because I think every mill should run its stuff out into a shed where it can be piled up convenient for teams to take it away.

I have drawn this $\frac{1}{16}$ of an inch to the foot except the surfacer which I set down without reference to distance.

If there is anything I have left out, I will be glad to give C. N. N. any other information he may require through the columns of the BUILDER AND WOOD-WORKER, if he will make his wants known.

Modern Jacobean Panels.

ONE of our readers interested in carving wrote us the other day complaining that some of the old examples published in these pages were not sufficiently explicit to "work from." We need scarcely say that the rough sketches of old work published in this journal are intended to inspire new ideas rather than to encourage mere copyism. At the same time definite details are essential to guide the learner, and with the view of meeting such a want we publish herewith three examples showing a rendering of Jacobean adapted to modern cabinet work. When we say that they are from the pencil of B. J. Talbert, it will be a sufficient guarantee of fidelity and skill. Although classified under one name, these panels represent three distinct species of decoration, and may therefore be considered separately. No. 1 is in reality four panels embodied in one design—*i.e.*, if each quarter is taken separately and repeated it will make a distinct panel. Whilst thus differing in minor points, the designer intended that these panels should be used together in the same article. This element in the design brings out an important feature in ancient as well as Talbert Jacobean, viz., general uniformity and balance of parts, combined with pleasing variety of detail. It would have been easier for the designer to have struck off one portion, and to have written on the corner "repeat four times," but such a multiplication would not do for the author of these sketches. In No. 1 we moreover find a conventional treatment of plant forms which has been so much cultivated since Talbert set the fashion, an element which is the distinguishing characteristic of modern Jacobean carving. It will be seen that the four ideas embodied in this one panel are equally suitable for a perpendicular or horizontal position. In fig. 2 we get a more ancient specimen of carving in the same style. It is a little study that serves to mark the connecting link between the Elizabethan and the latter phases of English Renaissance. The influence of "strap-work" originals is most evident in No. 2, and the design should be useful as showing how essentially decorative such a *motif* is when properly handled. The handsome entablature set forth in fig. 3 marks the period when Jacobean was rich in characteristic detail. In the center panel, with its Tudor rose and surrounding strap-work, we are reminded of Elizabethan, whilst the groundwork from which it stands out is more Jacobean in treatment. The presence of those ever recurring enriched bosses



or paterae, the scroll corners and egg and tongue margin, all denote the source of the design. In these examples the sections will be found sufficiently indicated to guide the carver in making a full sized working drawing from them to the desired proportions. Of late years carving in relief has not been so much cultivated as it ought to have been. To save expense the decorative spirit of Jacobean has been omitted, and what was left of old lines has been baldly made up, and often dubbed "Early English." In our opinion the production of Jacobean or Stuart furniture worthy of such names is impossible without the aid of the chisel, and we are therefore glad to be able to place before our carvers these carefully executed designs, showing the correct thing to cut when they are called upon to enrich cabinet-work produced under such nomenclature.—*Exchange.*

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor of the BUILDER AND WOOD-WORKER:

NEVER having seen a turning lathe in operation, and being stimulated by several articles in turning, which have appeared in the BUILDER AND WOOD-WORKER, I thought I should like to know something of the manner in which turned articles in wood are made, with a view of learning the art of turning.

In accordance with the foregoing I therefore venture to ask the following questions, which, I hope, some competent fellow-reader will take the trouble to answer in your next issue in as simple a manner as possible.

It may be that to the practical turner some of the questions may seem rather silly, but it should be considered that the questioner possesses no knowledge of the subject whatever, and is desirous to begin to get his knowledge at the very bottom. This lack of knowledge on one hand, and the desire to begin at the bottom, on the other, will, I hope, be my excuse for asking what may appear to the initiated as needless:

(1) How is the wood prepared for the lathe? (2) Are both hands

used to guide the work, or is the cuttiug tool guided by the hand? (3) How is the design applied to the work to be done?

I hope these questions will not be out of place, and that some one will find time to answer them for an old fellow-reader.

B. T. E.

Sommerville, N. J., March 26, 1882.

Editor of the Builder and Wood-Worker :

SEVERAL years ago there appeared in the Builder a design for a new steel square which I examined very closely, and which I think was perfection itself. It was understood at that time that an effort was about to be made to get number of squares made after the design, and I, along with several others of my friends, intended to get a square each of the new design when made. Now I should like to know the reason why these squares were never made. Was the matter given up at the Builder office, or was it thought that the square was not as perfect as it might be?

Ever since the papers on the "steel square" appeared in the Builder, in 1875-6, I have made the tool a special study, and have purchased everything that I have known of that has been written on the tool and its application. I have some new applications of the square that I may send you some of these days for publication, that have never appeared in print to my knowledge, though I know that some carpenters have used them for several years past. By the way, let me thank Mr. Gould for the handsome way in which he elucidated the Handrailing question asked by W. B. G. This is the right kind of information to get. J. N.

Toledo, O., April 12th, 1882.

[In answer to the above, we may say to J. N. that we offered the design of the steel square free of cost to any manufacturer who would undertake to make and sell squares made after it; but we found that it was impossible to get any manufacturer to undertake the work without getting a guarantee for a large sale of made-up squares. We offered to several makers to take 1,000, as we had then something like 600 orders in our hands; but this offer did not seem large enough to induce makers to accept our terms. We sent to England and to Belgium to see if we could make terms with manufacturers there, but found that although we could get them made in either of these countries, we could not get them into this market at anything like a reasonable price, owing to the enormous duty that would be levied upon them. It may be that we may yet induce some new manufacturing firm to take hold of them.—*Ed.*

Editor of the Builder and Wood-Worker :

I DO not wish to find fault or discourage any of your young contributors, but it seems to me that those who answer queries, when using the result of other people's brains, ought at least be honest enough to give credit to the book, paper, or person from whom they got their knowledge. In your last month's issue "Adept," in his reply to a "St. Louis Subscriber," who wished to know how to polish up turned work, gives an article that appeared in a New York journal some time ago, without giving the journal the slightest credit. Now I don't think this is fair. While the information is good, and perhaps the best that could be given on the subject, it is not the square thing for "Adept" to trot himself out in other people's clothes and lead them to believe they are his own. I think it would only be fair if you insist on your contributors giving credit for everything they use that is not their own. I have taken your paper for years—since 1871—and like the way in which it is handled, and I think this is the first complaint—if complaint it is—that I have ever had to make. Trusting the hint I have given will be acted upon, and that a "wink is as good as a nod to a blind horse," and a little better, I close. John ———

Jersey City, N. J., April 12, 1882.

Editor of the Builder and Wood-Worker :

I TAKE five magazines and two newspapers, but there is nothing that comes to my table that I like so well to get and overhaul as our Builder and Wood-Worker. I have derived more real benefit from its pages than from any of the other papers I have read; but this is not what I intended to say when I sat down to write. I wish to suggest that you occasionally publish some designs of upholstery work, and give us a few suggestions as to color, material, etc., and in trimming and draping furniture. Hoping you will publish this, so that some of your expert readers may have an opportunity to say something on the subject, I am, etc.

Ottawa, Ont. (Canada), April 3d, 1882. H. G——n.

The Ætna Life.

SURPLUS OF $750,000 ON A 3 PER CENT. BASIS.

THE Ætna Life Insurance Company announces that it has a surplus of $750,000, calculating its reserve liability upon the basis that it will hereafter receive but 3 per cent. interest on its investments. If in future years the company is unable to obtain as large a rate of interest as it is now receiving it has abundantly provided for such contingencies. Notwithstanding the Ætna has for some ten years past been paying large dividends to its policy-holders, its prospects for the continuation of these favorable results are encouraging.—*Hartford Evening Post.*

This department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Questions.

48. Architecture.—Can you inform me of a good school or college, for a young man of fair education, to attend, so as to acquire a good practical, as well as a theoretical knowledge of Architecture? A. A. P.

49. Photophone.—I know what a telephone is, but can't, for the life of me, make out what is meant by a Photophone. Will you, or some of your readers please enlighten me? Neff.

50. Doors.—Is there any recognized rule for designing doors? I am pretty well supplied with architectural works, but can not find in any one of them a satisfactory description of the manner or reasons for giving doors any particular height or width. If some of your professional readers would vouchsafe to give their less favored fellow readers a little information on the proportion of doors, and any other matter relating to these important pieces of builders' work, I, for one, would feel much obliged. Adept.

51. Painting Cement Plaster.—Will some one well up on this subject kiudly inform me if a Portland Cement plaster from ½ "to ¾" thick, covering the outside of a brick or stone building, should be painted immediately after it has been put on. Will not the paint effect the ultimate enduration of the cement, rendering it liable to crumble and fall off? G. V.

52. Mortar and Plaster.—Will some one be good enough to give me, through the Builder and Wood-Worker, the proper proportions for making mortar and plaster? I am a "young hand" and will deem it a great favor to get my question answered.

New Hand.

Answers.

We wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

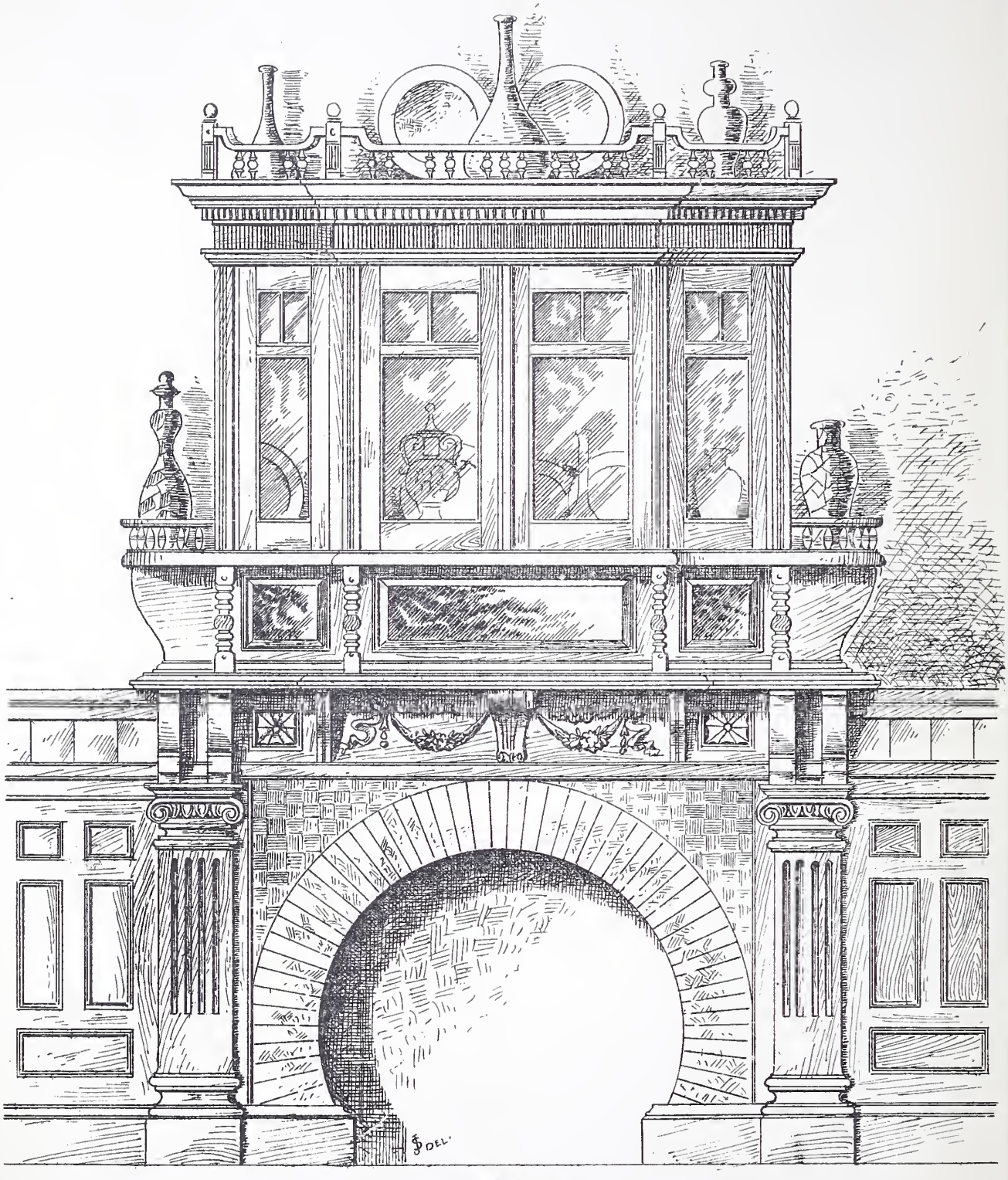
Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

41. Oil Stone.—Let Hurley boil his oil stone about two hours in ashen lye, this will bring all of the oil out, and stone will cut as well as new; and always clean all oil off after using; this will make it cut much better. Leaving old black oil on a stone will soon gum it; use clean lard or sweet oil.—J. L. N.

41. Oil Stone.—Boil your stone in a solution of lye and water for a couple of hours. I have tried this plan and found it soften a Missouri stone. I have never tried it on a Washita stone, but presume it will have the same effect on that as on a Missouri. If you use kerosene oil on your stone you will find that your tools will "bite" better than if you used other kinds of oil, and, of course, will sharpen much quicker.—Adept.

42. Grindstone.—Beginner can true up his grindstone quite easily by foot-power, if he goes the right way about it. I have

PLATE No. 36

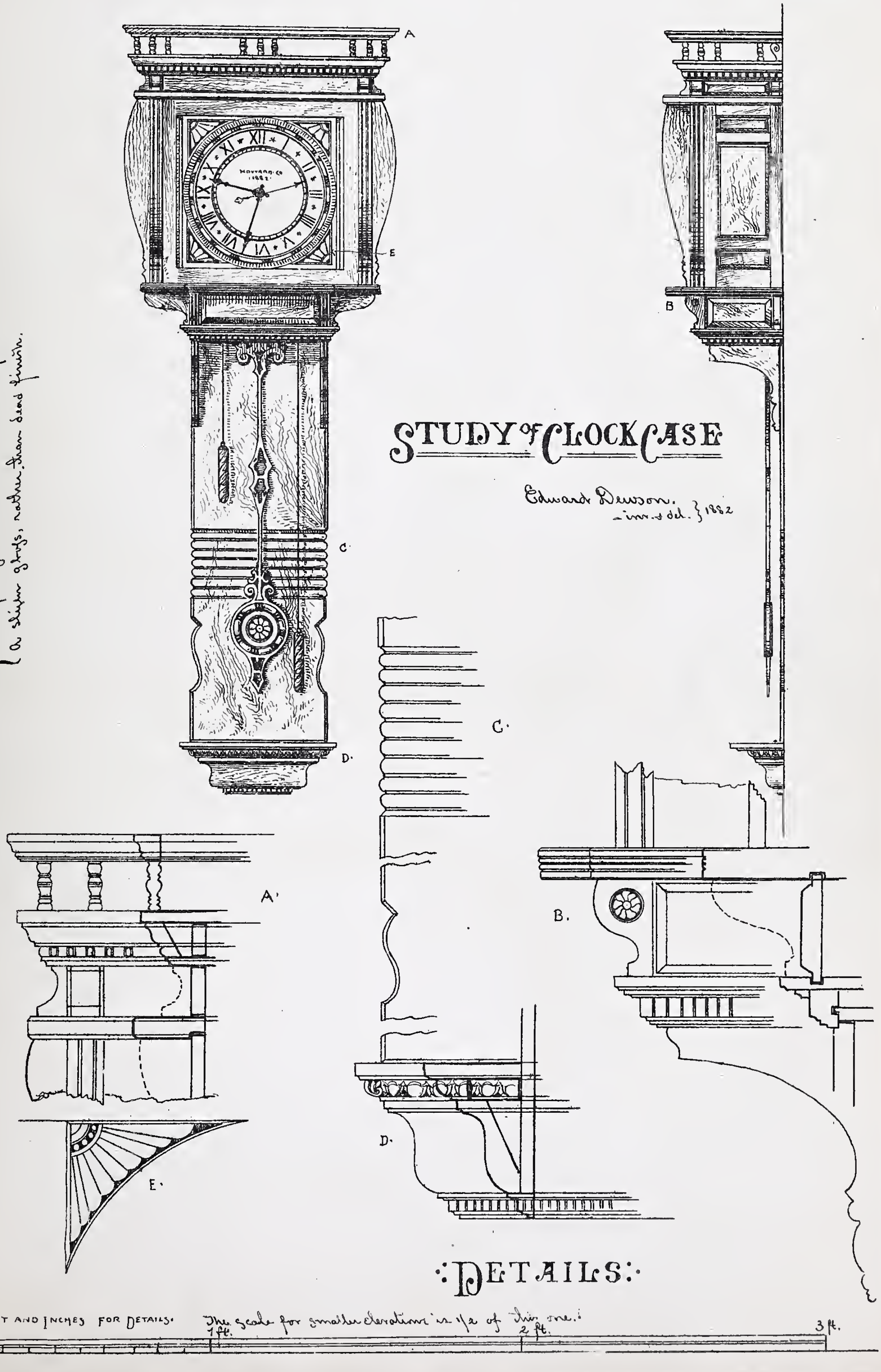


·:DINING R. MANTEL:·

·EDWARD DEWSON·ART DESIGNER·
·28 STATE ST. BOSTON.

PLATE No. 37

BUILDER AND WOOD-WORKER: HELPS TO AMATEURS SERIES.



Note. { Will look well, built of mahogany, cherry or some fine grained wood. Should be finished with a higher gloss, rather than dead finish.

STUDY OF CLOCK CASE

Edward Dewson. inv. & del. } 1882

DETAILS.

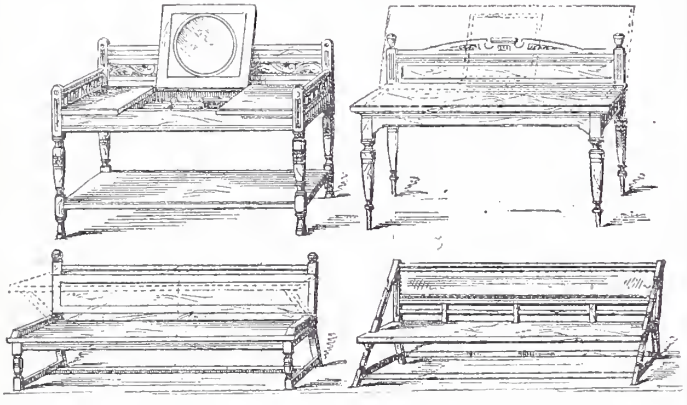
SCALE OF FEET AND INCHES FOR DETAILS. The scale for smaller elevations is 1/2 of this one. 1 ft. 2 ft. 3 ft.

often trued up a stone by using a half-inch gas-pipe for a tool, taking light cuts; but I have found that the best thing to use for a tool is a bar of half-inch square steel. Use one of the corners for a cutter, and when this gets worn blunt, turn up another corner, repeating the operation until the stone is true. The repeated turning of the steel bar always insures one sharp point or corner. The bar of steel should be fifteen or sixteen inches long.

I do not know of any tool that goes by the name "hacker." Perhaps some more experienced reader will inform "Beginner" on the subject.—NEFF.

43.—HALL FURNISHING.—We do not know that we can do better than publish the following, as it seems to apply to your query, and will prove of interest to many others of our readers. It is taken, along with the designs, from the *Cabinet-Maker:*

"Centralization, in political and social affairs, is the order of the day; but in the matter of hall furniture it may be unnecessarily adopted. Where space is limited, such an idea might be borne in mind; but, in other cases, by all means separate the articles, if this course will be more consistent with comfort, good taste, and a furnished appearance. Looking at the old hall table, we see an ordinary four legged article with a slip of wood screwed on the back, and at one end a drawer of uncertain length. This, however, is not a faultless piece of goods, for the back is most liable to break off, and the drawer, if hastily attacked, suddenly comes right out and pours its miscellaneous contents upon the floor. The digest of the accompanying sketches, therefore, is to suggest a few alterations that will tend to avoid such domestic misadventures, and, although the articles represented in the drawings may have rather a washstand look, yet such appearance, even if objectionable, would only be occasional. An explanatory word or two will suffice to show the advantages attached to our somewhat novel arrangement. In the case of the Jacobean table on the left, the top is made divisible, the center portion lifting up as a sort of flap, and thus



revealing a well below for the reception of hall requisites. Under this flap a piece of looking-glass might be fixed, which would, when the flap was thrown back, fall at a convenient angle for reflection. By the idea embodied in the illustration, the vexatious drawer is *abolished*, a more commodious receptacle for brushes, etc., obtained, and a useful mirror available when required. The top must of necessity be of wood, and might be fixed in a different way to that usually adopted; the grain should run from back to front, instead of from end to end. A few beads could indicate the joints, and at the same time not be of any detriment to the top. Some advantage in the construction may be derived from carrying up the legs right through, and tenoning the framing into them: at all events, a secure back would be assured, and a perfectly solid article obtained. In the more simple and inexpensive hall table shown in our illustration at side, the old lines of construction are adopted, whilst the dotted lines suggest the lifting of the whole of the top in the manner just described: this also might have looking-glass underneath. The box below would hold three or four times the number of articles that it is possible to "cram" into the usual absurdly small drawer; and the brushes would be much more "get-at-able." The expense in either case might be a little more than that involved by an ordinary drawer, for the inside of the framing must be cleaned up, and a strong bottom affixed; but the difference in the quantity of wood and amount of labor is scarcely appreciable. These hall tables are suggested as useful ideas when a separate article is insisted upon, and not with the object of superseding the hat and umbrella stand combined. In the matter of seats for the hall, a bench forms a nice variation from the stereotyped pair of chairs, when there is space or a suitable recess for its reception. The old-fashioned bench, with its wooden pillow at each end, cannot be commended either in point of beauty or comfort. Without some description of back such a seat looks bare and ugly. If, however, a decent bench cannot be afforded, it is well to have recourse to the hall chair. In our example of hall bench, on the left of the page, an attempt is made to show that it can be utilized for a double purpose—viz., hall flap or table, as well a seat. To accomplish this, the back is hinged on to the back legs on standards, and the two "wooden pillows" at ends of seat are also hinged at the back. When the flap behind is lifted into table position, the pillows can also be lifted, and will serve the purpose of supports from underneath. If these pieces of wood formed a bearing, in a notch or against a piece of wood, screwed on the under side, the support would be perfect; and to prevent their being wrenched off the hinges, in falling back to their places, a dowell hole should be affixed to each side piece. This idea might be eminently useful where, as so often happens in a narrow passage, extra accommodation is required. The remaining seat in our illustrations has no pretence to such combination, and is a departure in design from the ordinary pattern. To give ease and appearance to this bench, there is a stuffed leather pad at back: the stuffing, however, should be slight, and the *leather* or tapestry very strong and closely studded round the edge. The subject of seats, which is somewhat comprehensive, must be held over for another chapter, as the few patterns given hitherto do not by any means exhaust the almost endless variety of such articles. A lengthy review might be given of the history and style of the hall chair, from the date of its introduction until now, and the result might possibly be to establish an opinion in favor of the ideas of its progenitors. There was something so noble about the dignified productions of the Gothic, Elizabethan, and Jacobean periods, that when we come to the architectural, monumental, and narrow-waisted designs of our grandmothers' early days, or even of our own times, we must be painfully conscious of a deterioration of the species."

44. DECAY IN TIMBER.—In reply to "Quiz," I may say that Liebig, the great chemist, says that the cause of decay in timber is brought about by the following chemical changes:

1. The oxygen in the atmosphere combines with the hydrogen of the fiber, and the oxygen unites with the portion of carbon of the fiber, and evaporates as carbonic acid. This is called *decomposition.* 2. The actual decay of the wood which takes place when it is brought into contact with rotting substances. 3. The inner decomposition of the wood in itself by losing its carbon, forming carbonic acid gas, and the fiber, under the influence of the latter, is changed into white dust, which is called *putrefaction.* Fluids will pass with the grain of wood with great facility, but will not enter it, except to a very limited extent, when applied externally. —ADEPT.

45. ROUGH CASTING.—The following is said to be a correct method of treating an old brick wall when it is to be rough-casted:

In rough casting an old brick wall, the mortar should be raked out of the joints to the depth of about an inch, and the wall slightly moistened to make the plaster adhere. If dusty, it should be well brushed off before dampening. In laying a new wall which is designed to be rough-cast, the bricklayer should not run the mortar out to the edge of the joints; in general, the wall should be left as rough as possible.—MORTAR.

46. POLISHING WOOD-WORK.—The following, which is taken from Comstock's new work, "Interior and Interior Details," will probably suit a "New Reader": "Soft woods may be turned so smooth as to require no other polish than that which can be given by holding fine shavings of the same wood against them in the lathe.

"For polishing mahogany, walnut, and some other woods, the following formula is given: Dissolve beeswax by heat in spirits of turpentine until the mixture becomes viscid. Apply by a clean cloth, and rub thoroughly with another flannel or cloth.

"Beeswax is sometimes alone used. For work in position, it must be melted and applied and rubbed as above. For work in the lathe, it can be applied by fruition, the slight amount of wax melted being sufficient for the polish. The work should be thoroughly rubbed.

"Mahogany may be polished by rubbing first with linseed oil, and then by cloth dipped in very fine brick dust. (Nearly all mahogany furniture in England is polished this way.)

"Some hard woods have a natural polish, and do not require a polishing medium.

"A fine gloss can be produced by rubbing with linseed oil, and then holding shavings or turnings of the same material against the work in the lathe.

"A very perfect surface can be obtained with glass-paper, which, if followed by hard rubbing, will give a beautiful luster. Luster can also be given to carefully finished surfaces, by applying a small quantity of thinned varnish, shellac or 'fillers' by a cloth, and carefully and thoroughly rubbing.

"By contrasting the several methods of natural finish, very beautiful effects can be obtained."—ED.

Maple for Cabinet-Work.

ALMOST every one knows something about maples, but very few, even of experienced cabinetmakers and carpenters, ever think of these woods as being available for anything but firewood, or, perhaps, for the making of some delicate box where white holly is not available. The white maple (*acer rubrum*) is one of the whitest woods growing in this country, only exceeded in

that respect by one or two. It is, however, on account of its extreme softness and general lack of strength, practically valueless. The sugar maple (*acer saccharinum*) is one of the most useful trees we have. While it is very cheap in our markets, we cannot consider that it is a valueless tree, this low price of the timber resulting from the fact that it is not fashionable, and has not been used to any extent for anything save millwork and rough carpentry. Its grain is very fine, and, in hardness and general adaptability for fine carving and cabinet-work, stands next to boxwood. Beech somewhat exceeds it in the fineness of grain, but is not nearly so beautiful. The great strength of maple renders it valuable in all kinds of delicate work, preventing it from being readily broken, and, at the same time, allowing a slenderness of construction quite inconsistent with any weaker material. Almost all maple has in its structure a certain waviness which causes it, when polished, to reflect light and to appear almost dapple. Other varieties are the well-known bird's-eye maple, which, thirty or forty years ago, was a very popular wood for certain kinds of cabinet-work. Many persons suppose that the bird's-eye maple is a separate or peculiar tree, differing from other maples. This is a mistake. Most of the rock maples have a tendency to form little hillocks beneath the bark, and each layer of wood during growth is evenly covered over with these projections, which do not grow larger, but retain their original size. The result of this is, that when a slice is taken through one of these little lumps or pits, we find that the grain of the wood is bent up or down in a circle, and, of course, reflects the light differently from that part which is horizontal. In what are called bird's-eye maple trees, these little hillocks or pits in the bark are disposed closely together and regularly throughout the tree. In opening such a tree, when the cut is parallel to the bark, we have a board showing the bird's-eye maple markings. If, however, the cut is made radially, it passes through the hillocks vertically, and, as they extend from the heart to the bark of the tree, we have something which produces upon the wood the effect of a wave. When a log is sawn so as to show the eyes, it is known as bird's-eye maple, and when cut radially, so as to make the waves most prominent, it is called waved maple, or, in some places, curly maple. The wave pattern will almost always be found in any bird's eye board by looking at the edge, and *vice versa*. Maple has one advantage which has been improved very little by cabinet-makers, and that is its susceptibility to staining processes. The wood is capable not only of being ebonized, but of taking several very beautiful colors. We have seen bird's-eye maple for small work stained to a very beautiful drab, which harmonizes well with both furniture and decorations. The supply of this wood is abundant, and, fortunately, can be obtained in large size. Hitherto its principal value has been for fire-wood.—*Furniture Gazette.*

Talks About Tools.

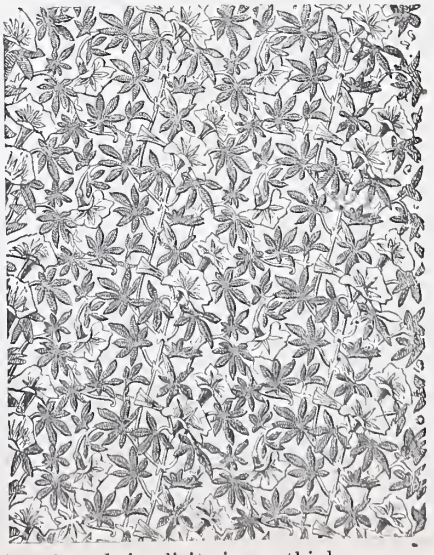
HOWEVER irksome the task may be, the proper sharpening of tools is worthy of the most careful study of those who would attain proficiency in their use. Some may suppose that sharpening a tool is one of the easiest things imaginable, and that to speak of making it a study is to employ far too dignified a word; but such is hardly likely to be the view of any but of the inexperienced. The tools to be seen on far too many carvers' benches bear witness to the fact that proper sharpening is not easy, or if it is, that their owners have yet to acquire the art. If the only object be to obtain an edge, without regard to the shape of it or the manner in which it is obtained, the simplicity of sharpening may be granted. But it has already been shown in these "Talks" that there is a close connection between the "handiness" or usefulness of a tool and the mode in which it has been sharpened. And a little reflection will discover to the most inexperienced learner that edged tools generally, besides carvers' tools in particular, are sharpened or brought to an edge in various ways and in accordance with the purpose for which they are required. The mortice and paring chisels of the maker, for example, though flat tools, are brought to an edge from one side only. The carvers' firmer is brought to an edge from both sides. The mortice chisel is brought to an edge at a different angle with the stone from the paring chisel, not only that the edge may be thicker, but that it may work in a certain direction—a direction corresponding with that of the mortice. Again, the maker's chisels, whether mortice or paring, are sharpened quite flat, whereas the carver's firmer, excepting, perhaps, the smallest sizes, presents when properly sharpened an edge slightly rounded. Yet each of these tools is flat. And that there are edges *and* edges may be illustrated by a reference to the familiar pocket knife which its youthful owner has essayed to sharpen a dozen or twenty times only to find its capacity for mischief effectually, and to him disagreeably, reduced. It is plain, therefore, that it is necessary not only to have an edge, but to have one of the right sort. In saying this much there is not the slightest desire to dishearten the learner, but merely to vindicate, if such be thought necessary, the proposition contained in the opening sentence of this paper. It would be unreasonable to suppose that the principles indicated in what has just been said could be apprehended without reflection; and there can be no intelligent sharpening until they have been apprehended.

In addition to this, only attention and practice will enable the learner to overcome what may be termed the mechanical difficulty of sharpening—to obtain that command of the wrist which shall ensure the scroll tool or voluter being brought to an edge from one end to the other at one angle only, and without rubbing away more from one part than another. Inattention to these points is frequently the cause of the bad working of a tool. The close connection between good tools and good work has often been pointed out, and so long as this is the case so long will the proper sharpening of tools be worthy of careful study. The irksomeness of sharpening may be granted, and we shall hope to point out the way in which the best result may be obtained with the least possible expenditure of time and trouble.

In the first place, a good stone is most important. A good stone cuts fast without being cut fast, and presents a surface unimpaired by shakes or holes caused by brittleness. Some twenty years ago the carver's choice of stones was almost entirely limited to "Charnley Forest" and "Turkey"—good specimens of the latter fetching high prices; but as in tools so in stones, our American cousins have widened the limits within which our choice may by exercised, and now we have "Niagara," "Washita," "Arkansas," the latter of which is excellent, though the others are not to be depreciated. The stone when bought is flat: *keep it so.* It is the practice of some carvers to sharpen scroll tools and voluters by rubbing on the stone with a motion backward and forward as in sharpening flat tools, and the stone is seen with a series of hollows of various sizes running lengthwise. But the practice of carvers generally, and experience may be said to support the practice, is to sharpen all but flat tools with a motion which, beginning at one end of the edge, ends at the other, and so on. It is, of course, for this latter mode of sharpening that the flat stone is recommended, and for this mode of sharpening that it is desirable to *keep* it flat. Reference has already been made to the importance of the tool being brought to an edge from one end to the other at *one angle only.* But sharpening in the way recommended on a *hollow* stone this result is almost impossible. To keep a stone flat even without rubbing it down is not particularly difficult if the stone is a good one, and a good "sweep" is taken in sharpening the tool. A short jerky motion must be avoided if the tool is to be free from ridges at the edge. Beginning at one end of the edge of an ordinary scroll tool, the other end should not be reached until the length of a good-sized stone has been covered. A stone for a firmer should be slightly hollow that the edge may be slightly round, but if a stone is too hollow for a firmer it is too hollow for a scroll tool and should be rubbed down. Good slips are no less important than a good flat stone. How greatly the insides of tools are neglected! Some tools are to be seen sharpened almost entirely from the back, whereas they should be sharpened almost, if not quite, as much from the inside. And this can be done with as little trouble by the simple expedient of fixing the slip so that both hands are available for pressure on the tool.—*Cabinet Maker* (*Eng.*).

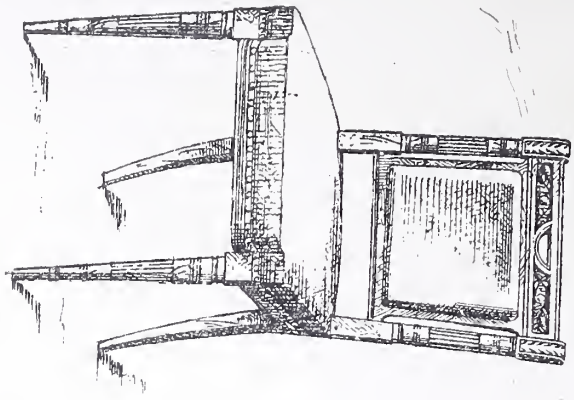
Wall Paper.

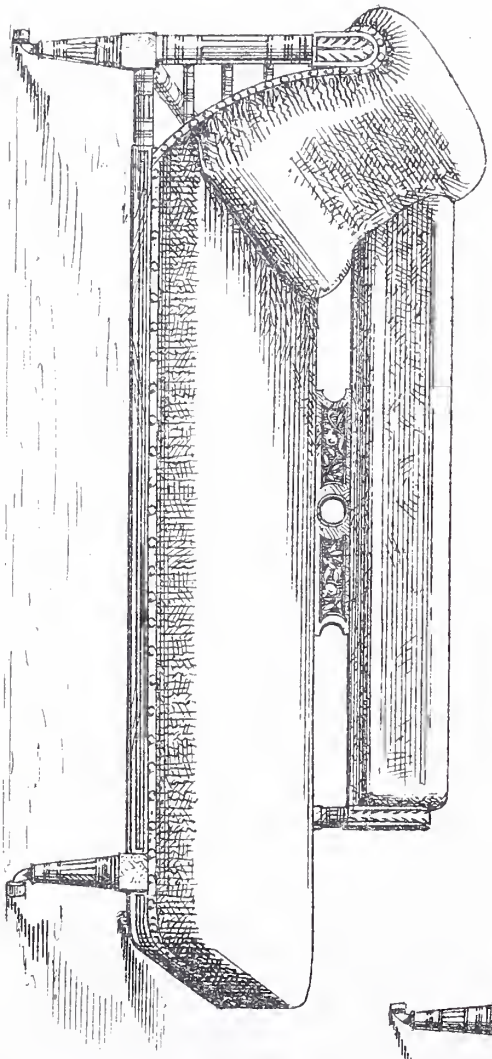
THE best results in art work are very often to be obtained by the simplest possible means, and by a judicious use of the most ordinary materials. Give a rough lump of clay and a stick of wood, or a sheet of coarse paper and a few different colored chalks to a man that knows how to use them and has artistic instincts—one who "mixes his colors with brains"—and he will produce good work, while the bungler, even with the finest material that money can purchase, or the conveniences and helps that the artist's colorman can make, will but elaborately bungle to the end of his

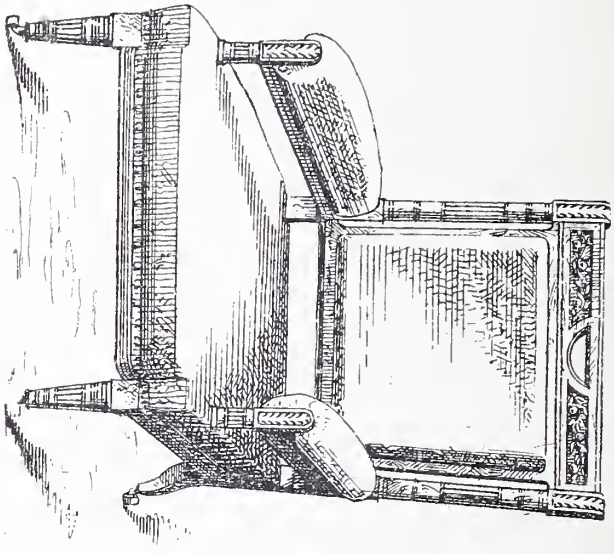


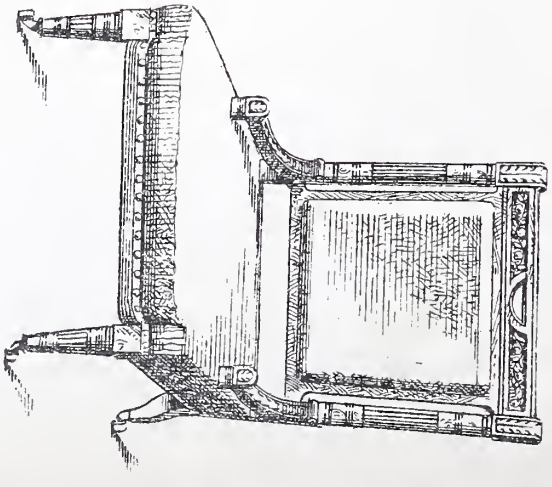
days. Their enforced simplicity is, we think, one reason why the

PLATE No. 38



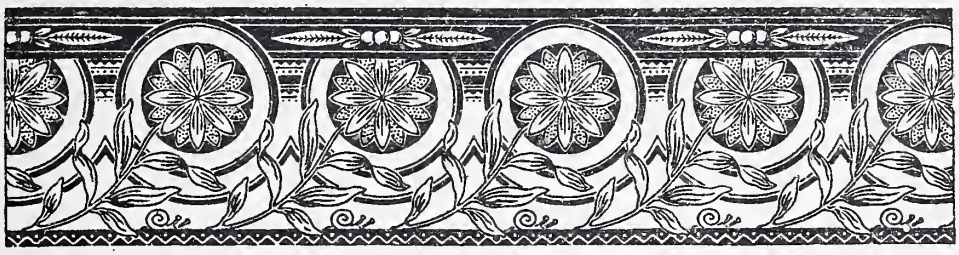


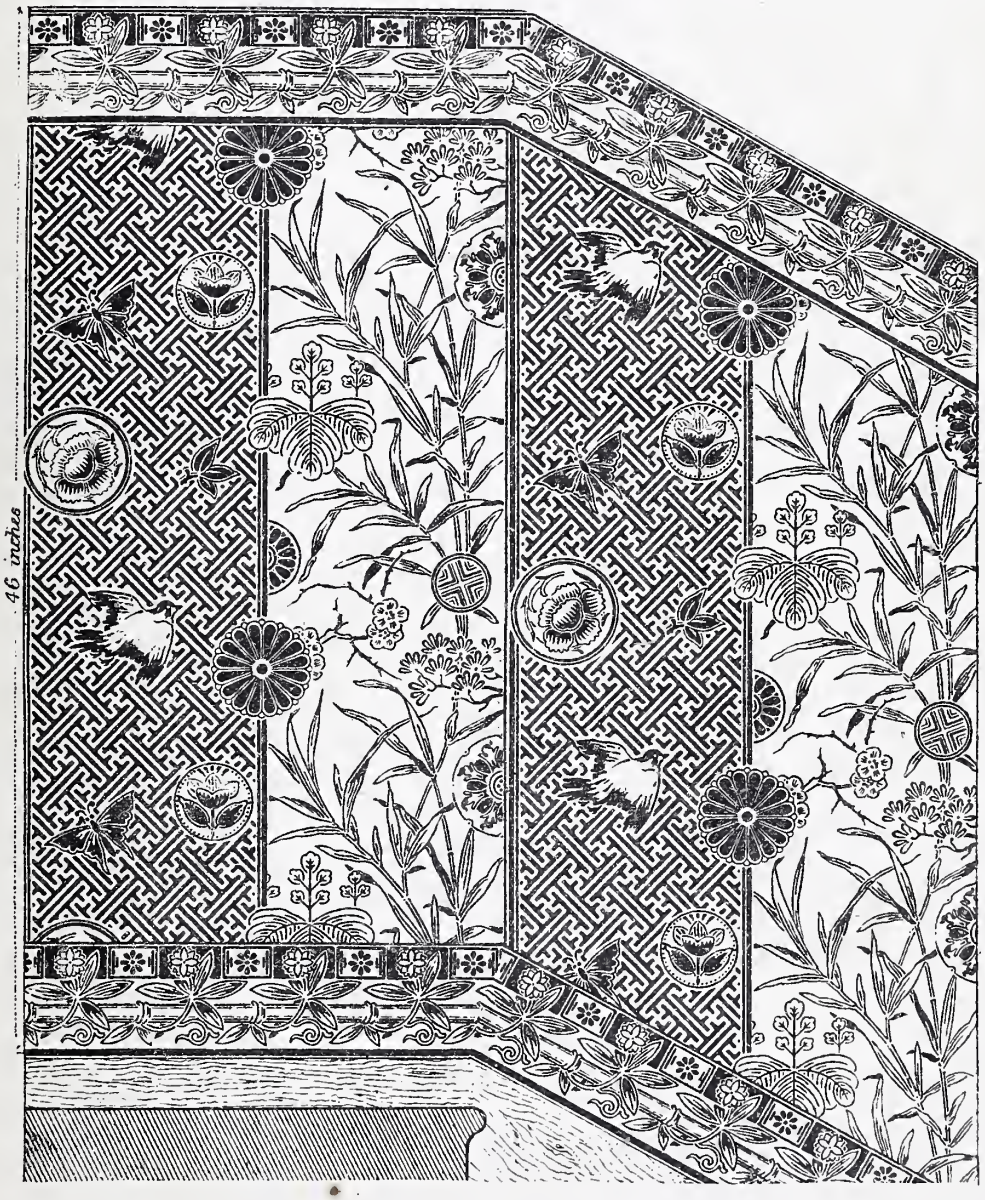




Design for Dining-Room Suite.

PLATE Nº 39





DESIGN FOR STAIRCASE DADO AND FRIEZE in "Anglo-Japanese" Style.

By LUTHER HOOPER.

results of the art efforts of partially civilized peoples, especially when they are of a decorative character, are, perhaps, the most satisfactory that have ever been produced; but whether this be the reason or no, it is certain that such results have been obtained among such peoples only by the judicious use of just such ordinary materials.

In designing wall paper, our best American artists have abandoned the old and depraved custom of weaving elaborate and intricate scroll work in their designs, and have adopted the more sensible plan of designing from nature almost direct. Some of the papers now exhibited by our American houses are simply elegant in style and exquisite in color.

We show herewith a very pleasing design, and one that may be used in any parlor, morning-room or library with good effect, if the surrounding conditions are favorable.

Some time ago, we visited one of our large wall paper manufactories and was surprised to see with what ease and perfection the most elaborate papers were turned out.

To see fifteen to twenty colors printed at one time in a single machine was a marvel, and the pleasure of watching the block-printing by hand was equally great. Here again, the large range of quality was surprising. Papers from 20 cts. a roll, up to the choicest artistic designs, stiff with gold and delicious tones of color, were to be seen in process of manufacture. A sunflower pattern in course of printing naturally attracted our æsthetic attention and it certainly rivalled Oscar Wilde's celebrated sunflower. Not the least interesting room in this large building was that devoted to the preparation and selection of patterns. No expense is spared to secure the best art talent in the market, and both American and European artists contribute designs to this house. To see these designs prepared for the rollers or cut on the blocks is another craft of great interest to the curious in such matters; indeed, the paper-staining business altogether is full of mechanical subtleties and artistic beauties calculated to delight alike the mechanician and the artist.

In future issues, we intend to have more to say regarding wall paper, both as to its style, colors, adaptation, manufacture, etc., and its cost, utility and dimensions.

OWING to severe illness, Mr. Kidder has been unable to prepare his usual monthly contribution for this issue. We feel that many of our readers will regret this very much, as Mr. Kidder's papers have always been full of good common-sense practical matter.

The Broken Plaque.

A TALE OF THE DECORATIVE ARTS, LOVE AND SOME OTHER THINGS IN NEW YORK.

ASPASIA O'SHAUGHNESSIE stood in her ancestral hall. Halls would sound better, but truth compels us to say that the O'Shaughnessie's leased only one floor of the Mulberry street mansion. On every hand were the evidences of wealth and that profound knowledge of decalcomanie, wax flowers, painting on coal scuttles, etc., which comes from long and abject perusal of the *Art Smatterer*, *Art Smatchange*, Clarence Cookie and other authorities upon æstheticism, and the best means of getting commissions out of dealers in raw materials consumed by young ladies or kitchen maids in their efforts to make home beautiful.

Beside Aspasia was a hat-rack decorated with "tiles" in the style *Irlandaise* of the 17th March. She had arranged the tiles herself after the last St. Patrick's day parade.

She walked into the parlor and flung herself down upon a *fauteuil*, on which was placed a tidy she had embroidered after a pattern in *The Weekly Tribune*.

"Be still, my beating heart, be still," she murmured, as she pressed her hand against one of Ridley's thirty-nine cent corsets. Aspasia, like most æsthetesses, paid less attention to those articles of clothing not intended for general inspection than to her outside garments.

There are brutal young men in New York and at Harvard, who declare that Oscar Wilde cuts off his trowsers at the knee to show his $4.25 silk stockings, and wears a thirty-seven cent undershirt, where no one can see it.

And yet there are people who believe that philistinism is dead.

Hon. Patrick O'Shaughnessie, ex-president of the Board of Aldermen, was the proprietor of a corner "store" in a lower ward.

He was a lover of art.

It was by its elevating influence he had risen to fame and power. When Aspasia became æsthetic, the old man kicked like a steer, but when she hung in his windows figured curtains with a broad red band made out of her plush basque of last year, he began to yield. The statesmen of the ward noted that O'Shaughnessie was getting up. Sun-flowers in wax, after models given in the *Art Smatterer*, were placed behind the bar and other similar evidences of taste were scattered with a lavish hand. O'Shaughnessie was no longer obliged to give a schooner for five cents. The awed and humbled citizen in the presence of such luxury was content with a small glass. He thus drank less and his day's wages would hardly enable him to get full. It is thus that the dissemination of art ennobles the lower classes of society. Even the actors who loaf around the doors of the Union Square Theatre are better men for gazing upon the statue of Lincoln.

They feel that no matter what might happen they never can get to look like that.

Of course as O'Shaughnessie was in the scale of New York society, Aspasia was eagerly sought in marriage. Two only of her multitudinous lovers had touched her maiden heart. Both were eligible in the highest degree. Each was on the road to wealth and sooner or later each would represent his ward in the municipal legislature.

Adelbert Flaherty was conductor on a Third avenue car. In confidence he had whispered to Aspasia that he was "cahoots" with all the spotters on the road. Aspasia knew that if he could keep it up a little while he could ere long be a stockholder, and perhaps a director.

Pat de Chateaubriand was bar-tender in a large concern down town. The proprietor having gone into statesmanship had deemed it becoming and necessary to be drunk all night and sick all the next day. "Darling," said Chateaubriand "before election day I'll own the sheebang."

In this cruel dilemma Aspasia had determined to let art decide the momentous issue of her life. At the ball of the "Helpers of Heaven" the night before she had asked each of the rivals to send her a birthday present of a decorated *plaque*. "Whichever sends me one that is truly and utterly æsthetic" she said to herself "shall possess the virgin heart of Aspasia O'Shaughnessie. If I can't decide between the *plaques* I will send them to the crockery editor of the *Smatterer* and abide his decision. The fatal day had come. Adelbert Flaherty turned into the stable after his last trip at noon. "divided" with his driver, put the "spotters," share where it would do the most good, and started for a crockery store to purchase a plate with a picture on it. He bought the biggest soup plate in the place, bearing a landscape in which was a Third avenue car in the foreground, with a steamboat going up the East River in the distance. It was a noble specimen of Pre-Raphaelitism and had none of the absurd conventionalism of the barbaric Chinese or Japanese about it. It was ordered to be sent to Miss O'Shaughnessie.

De Chateaubriaud unfortunately could not get off till five o'clock but he had great respect for his mother, and requesting her to make the purchase and send the present to his adored, he started on his usual hard day's work of "knocking down." While he was thus manfully striving to elevate himself in the world and gain a competency, Fate was likewise "knocking down."

Madam Bridget de Chateaubriand came of a thrifty race. She couldn't see the good of buying one plate and thus spoiling a set. She had once been the proud possessor of a tea set of stoneware decorated with blue pagodas and Chinese tea gatherers, such as in the time of James Buchanan represented the American idea of oriental art. Successive revolutions in the history of the De Chateaubriand family, representing struggles between himself and the late head of domestic government, had reduced it to two plates, one of which was cracked. She hesitated long between thought and fear of her son's anger, but finally did up the cracked specimen in an old newspaper, and having bribed a neighbor with a glass of beer, got the loan of her boy to deliver it.

The handsomely painted wagon of the crockery dealer and the red headed boy from Cherry street arrived at the same time.

Aspasia first looked at the Third avenue offering, "Beautiful," she murmured, "It is exquisite and it is exactly like some of the original designs in the *Art Smatterer*. Heaven help me not to be misled," and she unfolded the gift of De Chateaubriand. Her eye fell upon the crack.

"Thank Heaven" she cried, "I am saved. *It is an Antique.*"

L'ENVOI.

That evening when Adelbert Flaherty called at the O'Shaughnessie mansion he saw through the window Aspasia sitting in the lap of De Chateaubriand. He did not ring the bell, but mentally calling himself a blamed ass for fooling away a dollar and a half on that red headed girl, he went around the corner to an Exchange office and played 15 cents on policy to get it back.

It may occur to the reader that filial piety has something to do with the result of this story. Had not De Chateaubriaud had such firm trust in his mother, Art might have got left after all.

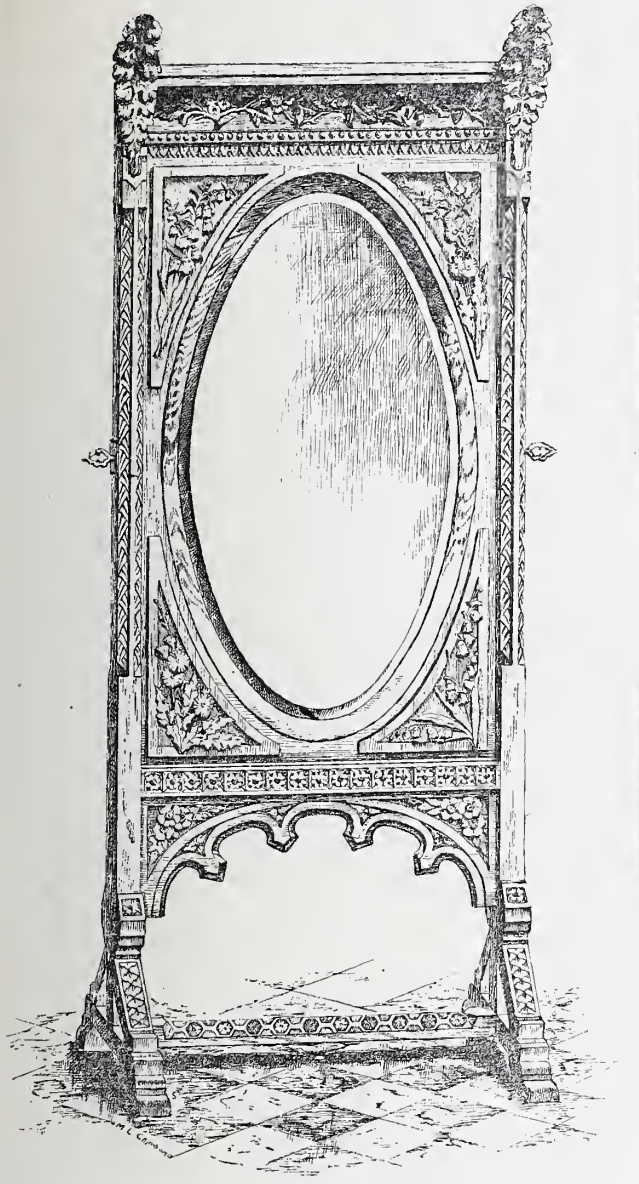
Nevertheless when he went home that night and found his honored mother drunk as a boiled owl on the money he had given her to buy the *plaque* he licked her within an inch of her life.

It was evident that he at least had no respect for the Antique.

Cincinnati Wood Carving.

THE illustration shown on next page, of a swinging mirror and frame, is an exact representation of a piece of carved work, executed in oak, by Miss Agnes Pitman, a pupil of the School of Design, Cincinnati.

We have also been favored with several photos of carved panels and other work, which have been executed by pupils of this excellent school, and would be pleased to reproduce them here, but unfortunately, without re-drawing, we cannot get plates of them. It must be remembered that the work shown is by an amateur,



though we must confess it is equal, indeed superior, to much of the carved work now in the market, which is said to be the work of professional workmen.

We hope to be able to present to our readers, from time to time, examples of work executed by pupils of this school.

Wonders of Simple Tools.

A COMPLICATED engine like the common wood-worker, the printing press, a compound lathe, or various forms of spinning and weaving machines, is really one of the most wonderful things in the world. Most of such contrivances are the product of the combined thought, study, experience and ingenuity of generations and ages; yet some of the simplest tools, either in their construction or use, represent a degree of ingenuity and manual skill which is astonishing. A common file is one of the simplest of tools to look at, and to a careless view one of the easiest to make. Files have been in use from the beginning and rank with the hatchet and hammer in simplicity and usefulness. From the time the naked savage smoothed his arrow head with a bit of sharp gritted stone, and the handle of his club with a piece of dried fish skin, to these days of finely finished work, the race of man has employed some form of file to accomplish mechanical results. Yet the making of the hardened steel file which is now so universal requires a delicacy of touch and exactness of movement that is wonderful. The diagonal cuts upon the sides of a common "three-cornered" file appear to the eye to be absolutely regular, uniform in their relative distance and alike in depth; the keenest vision is unable to detect any irregularity, and their cutting seems to be the work of a delicate and accurate machine. A close scrutiny also shows that the cuts grow finer, closer and shallower by almost imperceptible degrees of variation as they approach the tapering point. Upon the smaller files of the regular sizes there are more than two hundred of these parallel cuts to the inch, and in some of delicate make, for special purposes, this degree of fineness is greatly exceeded. Yet this wondrously delicate and accurate work is done, not by the aid of machines with minute micrometer screws and gauges, but with a simple hammer and chisel in the workman's hand. The advance of the chisel upon the blank at each cut of the two hundred and fiftieth part of an inch, neither more nor less, is regulated simply by the unaided sense of touch. The weight of the blow, also diminishing or increasing at each stroke by a fraction of an ounce as the cutting approaches or recedes from the point, is regulated solely by the judgment of the workman: All this is done without pause or hesitation to correct or re-adjust, and with a rapidity which shows itself in the cheapness of the finished file. File cutting is rendered still more delicate and difficult by the varying hardness of the same bit of steel at different points in its surface, which would cause blows of equal force to make cuts of varing depth and width. This unequal hardness must be perceived as the cutting progresses, and allowance must be made for it all through the operation. Doubtless all this seems easy enough to the practised file cutter, and he does his work without even thinking of these difficulties. Yet the education of hand, nerve and brain to such a perfection of movement is certainly a most wonderful illustration of perfection attained in the use of tools. For more than one hundred years efforts have been made to cut files by machinery with only partial and moderate success, the process, simple as it appears, being too delicate for less perfect instruments than the human hand and brain.

REVIEWS OF TRADE LITERATURE.

We deem it our duty to keep our readers advised of the publication of al works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

INTERIORS AND INTERIOR DETAILS. Published by Wm. T. Comstock, 6 Astor Place, New York. Price $7.50.

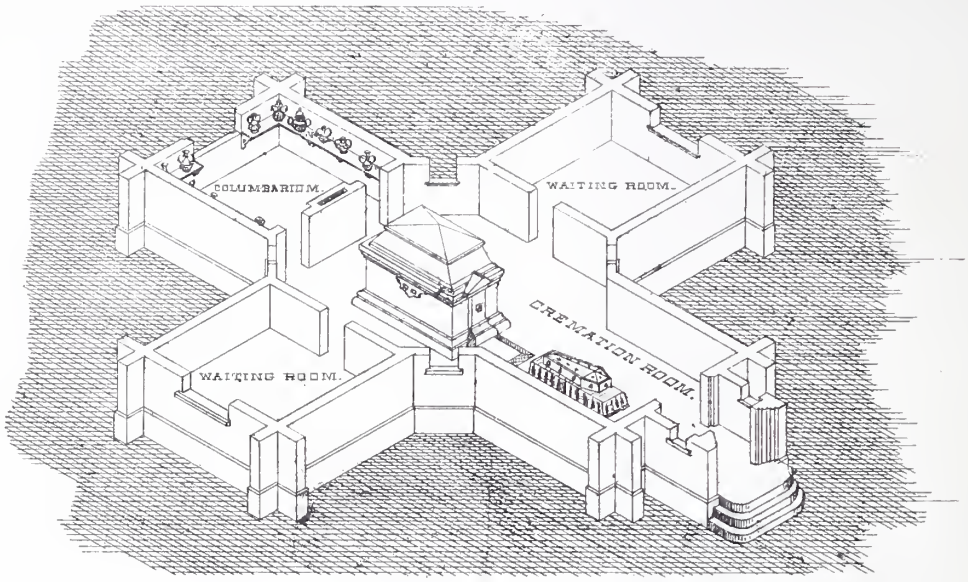
We referred to this work in our March number, but as it was not complete at that time we could only speak of plates we examined. Now, however, with the 52 plates before us, we feel safe in saying that "Interiors and Interior Details" meets a want that we know, editorially, has long been felt. Architectural works, as a rule, do not give interior finish that prominence it deserves, and a work devoted exclusively to this class of designs, cannot fail of being appreciated by those for whom it is intended.

We cannot do the work before us fairer justice than to publish the contents, which we do below: Frontispiece.–Perspective view of a large and elaboratcly finished entrance hall. Plate 2.–Entrance hall (perspective). This plate shows entrance hall opening into a staircase hall beyond. Plate 3.—Details of Plate 2. Plate 4.—Side of a hall, with details. Plates 5 and 6.—Give plans and details of two staircase halls. Plate 5 also gives a design and detail for a ceiling in dark hard wood, cherry or mahogany. Plate 7.—Interior of hall, showing fireplace, aleove and staircase, with details. Plate 8.—Pen sketch of a staircase hale with details. (Perspective.) Plates 9 and 10.—Hall suitable for a small country house iu the colonial style. (Elevation). Plate 10 gives the details. Plate 11.—Staircase and bay-window, and dotails. (Elevation.) Plate 12.—Staircase in a city house. Plate 13.—Details of Plate 12. Plate 14—Suggestions for stairease, showing newels and part of runs. Plate 15.—Design for a staircase hall, with details. (Colonial style.) Plate 16.—Design for finish of parlor in cherry. Elevations of two sides of room and details are given. Plate 17.—Interior of library. (Perspective). Plate 18.—Interior of library (in colonial style) showing mantel and bay-window (elevation), with plan and detail of frieze and mantel. Plate 19.—Side of a library, with details. (Elevation.) Plate 20.—End of dining-room and details. (Elevation.) Two designs of flooring are shown in the plan. Plate 21.—Side of dining-room and details. (Elevation.) Showing side-board and details. Plate 22.—A café interior. (Perspective.) This plate also gives an ele-

PLAN
OF
CREMATORY.
S.M.HOWARD,
ARCHT.
Wheeling
W.Va.
U.S.

SHEET. 2.

PLATE No. 40



vation of the mantel and a plan of the room. Plate 23.—Details, furniture and fitting of café (Plate 22.) Plate 24.—Office of estate of Wm. C. Rhinelander, Esq., deceased. The plate includes plan, stairease, partitions, mantel, etc. Plate 25.—Chimney-piece in a city house, with details. Plate 26.—Designs for two wood mantels with details. Plate 27.—Sketches of four small mantels, with details. Plate 28.—Designs for mantels of low cost, with details. Plate 29.—Designs for two mantels; also designs for wainscoting. Plate 30.—Interior and exterior doors; seven designs. Plate 31.—Examples of window and door finish. Plate 32.—Designs for doors, with details. Plate 33.—Designs for trims of doors and other openings, with details and sections. Plate 34.—Wood and plaster cornices (one-half full size). Plate 35.—Wood ceiling; four designs, with details. Plate 36.—Designs for wainscots, with details. Plate 37.—Examples of paneling for wainscots, ceilings, &c. Plate 38.—Hall furniture and details, including designs for hat-rack, hall table, chair, &c. Plate 39.—Designs for book-cases, with details. Plate 40.—Dining-room furniture, containing designs for two side-boards, one of which is planned to be placed in a corner. Plate 41.—Dining-room furniture, including side-board (built in), with details. A plan of a ceiling in wood and plaster is also given. Plate 42.—Suggestions for bank or counting-room, finished in hard wood, with details. Plate 43.—Details for drug-store, including wall cases, cashiers' and prescription desks, and two designs for letter boxes. Plate 44.—Details for drug store, giving four designs for counters, and a design for show case. The upper part is open, and the central part closed on all sides with glass doors. The space below is partly filled in with a spindle lattice, making a receptacle for sponges. Plate 45.—Screens for stores, offices, &c. Plate 46.—Store fixtures, showing wall-cases, counters, &c. Plate 47.—Fittings for a store, comprising open shelf cases, cashier's desk, table counters, chairs, &c.; with details. Plate 48.—Store fitting, including designs for shelving, paneled and table counters, cashier's desk, with details. Plate 49.—Bar-room and details. (Elevation.) Plate 50.—Finish of an apartment house. This plate includes a plan of the apartment, and designs and details for main stairs and doors. Plate 51.—Finish of an apartment house, giving designs and details for parlor and dining-room mantels. Plate 52.—Finish of an apartment house, giving hall wainscot, designs and details of doors, kitchen dresser, &c.

CHEAP DWELLINGS.—A series of neat and comfortable city and country residences. Illustrated and described by carefully prepared plans and specifications, and accompanied by reliable estimates of cost. Published by the San Francisco Bulletin Company, California. (Paper.)

This is a work of some 56 pages of text, and 47 pages of illustrations. Twelve cottages are shown, costing from $600 to $5,000. Some of them are rather pretty, and most of them are conveniently arranged inside. A specification and detailed estimate is given with each cottage, and this, in our opinion, is the best feature of the book, providing the estimate is correct, or approximately so. The illustrations are something better than we usually get from the Pacific coast. Doubtless the book will have its use in California and adjoining territory, for which localities it was designed, but there is no place for it east of the Rockies, only as an illustration of progress on the Pacific slope.

SOME POINTS IN LAW OF INTEREST AND USE TO BUSINESS MEN.—By Everett D. Barlow, Attorney and Counsellor, 206, Broadway, New York.

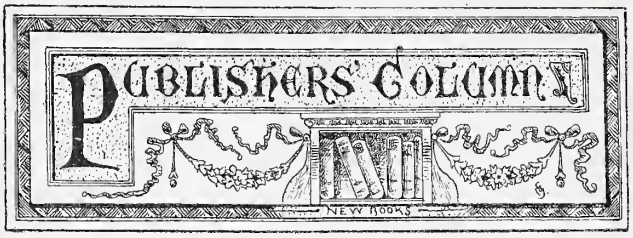
This is certainly a very useful little pamphlet for business men, as it explains a great many points of law in a condensed form, that are continually cropping up in every-day transactions. It is clear and explicit on matters regarding Mechanics' Liens, Notes and Bills, Usury, Wills, Partnership, Attachments, Arrests, Landlord and Tenant, and many other things.

[Any of our readers will be welcome to take part in this Department.]

A. A. P., St. Louis, Mo.—You can receive a first-class training in practical and theoretical architecture in the Cornell University, Ithaca, N. Y. This institution provides a four years' course in architecture, embracing the necessary scientific and mathematical studies, the history of the art and constant practice in drawing and designing. Students not candidates for a degree may take a partial course. Persons 21 years of age, having a good common education and a fair knowledge of drawing, will be received on the recommendation of the professor in charge of the department, as special students, without the usual entrance examinations.—J. L. N., Burlington Junction, Mo.—Thanks for your good words, come again.

C. B. D. M. would like some one to give him the address, through this department, of the parties who deal in R. C. Ochurle's Star Gold Paint.

SUBSCRIBER, Indian Orchard, Mass.—You forgot to sign your name to the note sent us. We do not usually pay any attention to letters sent us without the names of the writers come also; in this case, however, we waive the rule. You will find a scale of feet and inches on the plate. However, we give you the following dimensions, which you can vary to suit your purposes: Width of chest, outside, 1′ 11″; length, 3′ 2″; depth over all, 2′ 2″. This size is pretty large for an ordinary tool chest, but not too large for one who intends to gather up a good supply of tools.



☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881, can now be obtained from this office. Price $2.50.

THE New York Stencil Works have removed from 87 Nassau and 130 Fulton streets, N. Y., to 100 Nassau street, where they are prepared to execute all orders for steel stamps and stencil work.

WM. PEOPLES, of No. 113 Webster street, Alleghany City, Pa., is manufacturing a first-class bench vice. It is especially adapted to the requirements of stair builders, carpenters, car-builders, and wagonmakers. Write him for particulars.

J. H. SERENE, the great soap-stone man, has been kept quite busy of late filling orders for laundry tubs, bath tubs, tanks, fire place linings, registers, frames, &c., &c. He is just now completing fire-place linings in the house of Ogden Goelet, Fifth avenue, New York.

J. A. FAY & CO., Cincinnati, O., manufacturers of patent wood-working machinery, are now turning out some excellent power mortising machines and band saws. Their planing, matching and beading machines, are something extra, and persons in want of such machines, or in fact, any wood-working machines, should examine those made by this firm.

WM. T. COMSTOCK (late of the firm of Bicknell & Comstock), architectural publishers, has removed from 194 Broadway, to 6 Astor place, New York, and now occupies a commodious store on the ground floor, where he will be glad to see any of his numerous customers who may please to call on him. Mr. Comstock keeps a full line of architects', draftsmans' and surveyors' supplies. His stock of architectural works is very large and complete.

JOSEPH C. TOLD, of Paterson, N. J., manufacturer of the new patent Baxter engine, has had such a rush of work lately that he has been compelled to take in Mr. Simonton as a partner. It is not at all surprising that the Baxter engine is in great demand, as it is one of the greatest inventions of the day, and the low price at which it is sold will make it one of the most popular, and the most useful motor for the hundreds of uses to which it can be applied, that has yet been presented to the public.

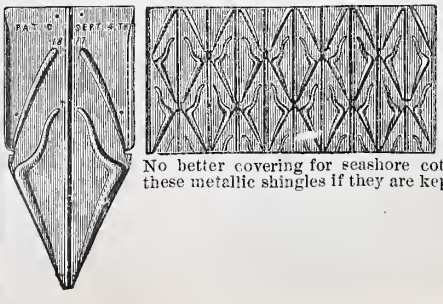
WM. GIBSON & SONS, 143 East Thirty-third street, New York city, will take pleasure in showing visitors through their show rooms and factory, where they have on exhibition some very fine specimens of stained glass work and mosaics. This firm deal largely in crystalline and 13th century antique glass. Their show rooms also contain many things in the shape of statuary, stucco work, bronzes, curios, and old carved furniture, that would gladden the heart of the seeker after these things. For those who take an interest in these matters, an hour spent in this establishment, will be an hour spent in pleasure.

CAUTION.—Having discovered in a number of instances, that unprincipled dealers are selling an inferior article called "HARD OIL FINISH," representing it as being manufactured by us, we deem it a matter of justice to ourselves and all consumers of this article, to prevent, as far as we are able, such disbonest practices; and for this purpose we shall now place over the bung of each barrel, half barrel, and keg, containing our "HARD OIL FINISH," a round tin, securely fastened, stamped "BERRY BROTHERS' CELEBRATED VARNISHES," and all cans will be fully labeled on sides and cork. We hope in this way to prevent any further deception.

BERRY BROTHERS,
Varnish Manufacturers, Detroit, Mich.

J. W. REEDY, 532 to 536 Canal street, New York, manufacturer of Reedy's patent hoisting machines, steam hydraulic and hand-power elevators, is kept very busy just now, indeed, his shops are worked to their utmost capacity, so great is the demand for his machines. He has just completed an elevator for freight and passenger use for R. G. Dunn & Co., Mercantile Building, Park street, New York. Also two hydraulic—and passenger and freight—and two power freight elevators, 5,000lbs. capacity, in O'Reilly's storage warehouse on Forty-fourth street and Lexington avenue. The firm is also putting in elevators in Sheppard Knapp's building, Sixth avenue, the Glen Cove Starch Co's. warehouse, on South street, and many others.

THE Anglo-American Roofing Co., of 22 Cliff street, N. Y., are offering their trade circular free to any one who will send them their address. This firm manufactnre a shingle that is at once durable, light, and absolutely water-tight. The cut shows a portion of a single shingle, and a portion of a roof shingled. No better covering for seashore cottages can be found than these metallic shingles if they are kept well painted.



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THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

PUBLISHED MONTHLY,

AT

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CHARLES D. LAKEY, PUBLISHER. FRED. T. HODGSON, EDITOR.

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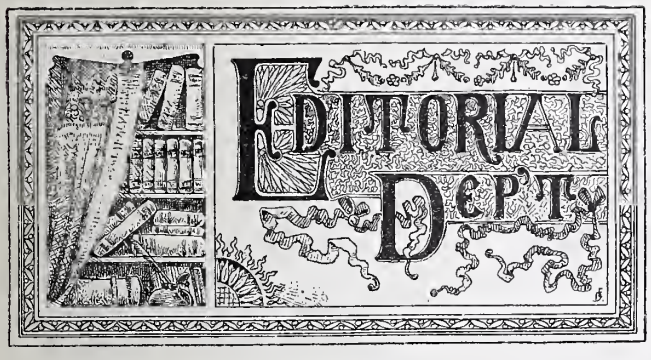
N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } JUNE, 1882. { WHOLE NUMBER, 177 / NEW NUMBER, - 6



WE take this opportunity to thank the large numbers of our readers who have sent us their congratulations on the improved appearance of recent issues of THE BUILDER AND WOOD-WORKER, and for their kind wishes for our prosperity.

We shall use every effort in future to keep the paper up to its present high standard, and to make such improvements from time to time, as may be considered in the interests of our subscribers.

THE City of New York is steadily growing, notwithstanding the enormous taxation and killing management she labors under. It is quite true, as the *Real Estate Record* says, that there are not so many new dwellings being put up this spring as there were last, but there is, after all, a great deal of activity in altering old houses, in providing accommodations for new business enterprises, and in starting or completing large apartment houses. Times may be bad in general trade, but it is evident that our mechanics have all they can do for the year to come. Plumbers, masons, house painters, plasterers, all are busy, while the house furnishers and decorators are pretty well assured of constant work until the winter season. Still there will be not so many new private houses as were erected last summer, but the increase in the number of apartment houses will doubtless make up for the lack of increased accommodations. Despite the croakers the country is growing, while the percentage of increase is greater in New York than in the country at large.

THE new money-order system recently introduced by the American Express Company, besides reducing cost of transmitting small amounts, has further advantages over other methods. These orders are so printed that they connot be "raised," nor can the date be changed, and they are payable at any office of the company given in the printed list on their face. The rates are, $1 to $5, 5 cents; $5 to $10, 8 cents.

The system will be a great boon to publishers and subscribers to magazines and papers, as remittances for subscriptions, &c., may be forwarded with a minimum of trouble, cost and risk. We hope to see the system extended to all points where the company has offices.

GENERALLY, rats gain access into a house by way of the drains, and no greater nuisance can possibly be in and about a dwelling than such rapacious depredators as rats and mice. If once they gain a foothold in the basement, it is very difficult to rid them out, but a very cheap method of preventing their ever getting beyond the basement story, may be adopted by placing strips of sheet-iron or tin, five inches wide, under all the partitions and walls, in the upper stories, or by filling in between the studs, one tier of brick-work laid in good cement. If the first story is thoroughly protected there is no chance of their getting up between the partitions.

TO prevent rats from getting into the basement, the drain-pipe should be protected with a galvanized wire grating outside the house, where it can be from time to time examined in case of obstructions occurring at that point. It is the nature of the rat to burrow obliquely alongside of a wall until he reaches the foundation, but if he meets with an obstruction the animal appears not to possess the instinct to burrow around it; if, therefore, slates or old sheet-iron were imbedded a couple of feet below the surface of the earth all around the house, it would effectually prevent their ingress. Where a house is infested with rats, it is a good idea to pour coal tar into all their holes, being careful not to close the holes up, as they will not make new ones so long as the old ones keep open. As rats are very particular about the cleanliness of their paws, they will retire disgusted when once their feet get smeared with pitch or tar. Whatever animals may be remaining in the upper walls after this experiment must be caught with traps, or killed by other means, as they will not run the gauntlet of the tar.

THE employment of iron as a substitute for bricks in the construction of large buildings is ever on the increase, but there is certainly room, and indeed a necessity for the exercise of a greater amount of discretion in its modes of application. A common error is that of injudiciously combining the two kinds of metal—cast iron and wrought iron—and this is calculated sometimes to lead to disastrous consequences. A cast-iron beam, for example, is so rigid, hard and crystalline, that the breaking point is reached with a very small amount of deflection, and this is especially the case when the material is of an inferior character. Wrought-iron, on the other hand, is ductile and flexible, and a beam composed of it

elongates by tensile strain, and deflects to a very great degree before reaching the breaking point. It is easy to understand therefore that a union of the two—unless under the most careful and cautious circumstances, is likely to be fraught with dangerous results. In whatever way wrought-iron tie-rods, pins or bolts and cottars may be attached to the sides of a cast-iron beam, the chances of elongation from tensile strain, and of wear and corrosion when the ties are joined, must be very great. Then, as neither of the two kinds of metal from its own individual strength is equal to the task of sustaining the entire load, the failure of either must inevitably lead to disaster. Many other examples of the bad effects of an inharmonious combination of the two descriptions of metal in question might be adduced, but our present purpose is to call the attention of designers and others not well versed in iron construction to the impolicy and danger of working upon the combined principle.

WILLIAM H. VANDERBILT, before leaving for Europe, visited the Moravian Cemetery at New Dorp, Staten Island, for the purpose of inspecting the unoccupied parts, with a view to selecting a site upon which to erect a family mausoleum. The place he selected is near the plot of Francis George Shaw, on high ground in the western part of the cemetery. The site commands an extensive view of the surrounding country with the sea beyond, while below on all sides are beautiful slopes. Mr. Vanderbilt has already obtained designs for the work from several artists in this country, and while abroad he will secure additional plans from European artists.

We hope Mr. Vanderbilt will find that the designs furnished him by American artists are up to the necessary standard and equal to any he can procure in Europe.

We are convinced that there is artistic talent enough in this country, if it is duly encouraged, to meet the artistic needs. Indeed, the introduction of foreign designs, when paid for by American money will not have a tendency to encourage anything like distinct American art.

IN a London paper is published a letter from Mr. F. H. Gossage, who makes some very important statements. He says: "I find that painting woodwork of any kind with several coats of solution of silicate of soda, and finishing off with a mixture of this solution and sufficient common whiting to make it about as thick as ordinary paint, is a most excellent protection against fire. Wood treated in this way will not take fire from mere contact with flame; it requires to be heated till destructive distillation begins. Then, of course, gases are given out which ignite, and the wood is gradually converted into charcoal, but until destructive distillation takes place the coated wood will not support combustion. A few years since I had some screens made like ordinary doors, some prepared as I have described, and some not. They were then placed over a fire of shavings, which was kept constantly renewed. In 10 minutes the unprepared screens were blazing away, and so nearly consumed that they had to be supported by an iron bar. The flames continued to lick the prepared screens for 30 minutes before the distillation commenced. After 45 minutes the coated screens were still intact, and able to support themselves; and in an hour, although pierced in many places with holes, they held together, and when the fire was removed they did not continue to burn. This was a splendid success, and I have still the remains of the screens. The experiments were made at my suggestion, for the managers of the Liverpool Philharmonic Society, and the woodwork of their splendid hall at Liverpool was treated in this manner. I am sure a good deal might be done with this simple and inexpensive process to reduce the possibility of fires, especially in public buildings, theaters, etc., for, if the woodwork was thus treated, draperies and scenery would burn away before the heavy timberwork of the structure would take fire."

WE have frequently had inquiries for cheap cottages for mechanics, and in reply we publish five designs on Plate 41.

Design 1, is adapted for a young mechanic and his wife, and can be built for about $500 complete.

Design 2 is also adapted for a man and his wife and one or two children. The cost will be about the same as Design 1.

Design 3 is a very convenient house for a small family. Cost about $450.

Design 4 will cost about $600; two good bed-rooms may be made on the second floor.

Design 5 is a rather more expensive house than any of the preceding designs.

The cost of this house finished complete, painted three coats inside and out, will probably run up to $1,500.

On Plate 42 we exhibit a very handsome cottage designed by J. A. Wood, Architect, 240 Broadway, N. Y.

Plate 43 shows front and side elevations and floor plans of a cottage built in Iowa City, Iowa. It was designed by L. E. L., of Iowa City.

Plate 44 shows alternative designs of a store, with first-story plan. The designs are by S. M. Howard, Architect, Wheeling, W. Va.

Plate 45 exhibits a dining-room mantel. The design is by Edward Dewson, Art Designer, 28 State street, Boston, Mass.

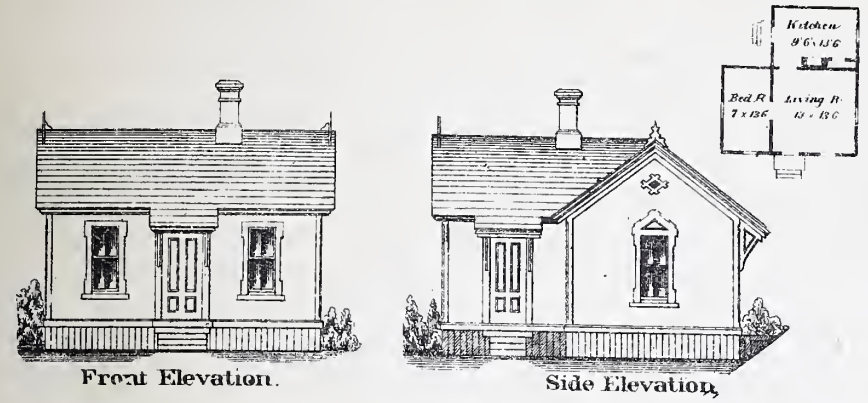
Plate 46 shows a design for another mantel by the same hand that designed the one on the preceding plate. The one shown on this plate is intended for a hall.

Plate 47 shows some designs for fashionable upholstery. The variety in upholstered goods seems to be endless, judging from the new designs constantly pouring into the market. Such easy chairs as are illustrated on this plate, are certainly growing in popular favor. The public insist upon luxury in their reception rooms, notwithstanding all that has been written in favor of asceticism and simplicity. Amongst the designs here noticed are some captivating patterns, perfect types of elegance and comfort in their way. They form but a small portion of what may be found in some of our first-class furniture dealers' stocks.

Plate 48 is reproduced from the *Carpenters' and Joiners' Assistant*, at the request of L. R. T., Cincinnati, Ohio. In the whole science of joinery there is no rule or method so useful as that used for obtaining, raking and diminishing moldings. The plate here furnished gives all the rules necessary for this operation.

Figure 1 shows part of the raking cornice of a pediment, with the horizontal part of the molding on the left of the figure. Draw $g\ o$ perpendicular to the horizon, and $o\ h$ at right angles to $g\ o$. In $o\ h$ take any point l, and draw $l\ d$ parallel to $g\ o$, and cutting the profile in d, and through d draw a line $d\ x$, parallel to the line of rake. Then to find the section of the raking front, draw any line A B, perpendicular to $d\ x$, and make A r equal to $o\ l$, and draw $r\ x$ parallel to A B, cutting $d\ x$ in x; then the point x is a point in the raking profile.

PLATE No. 41

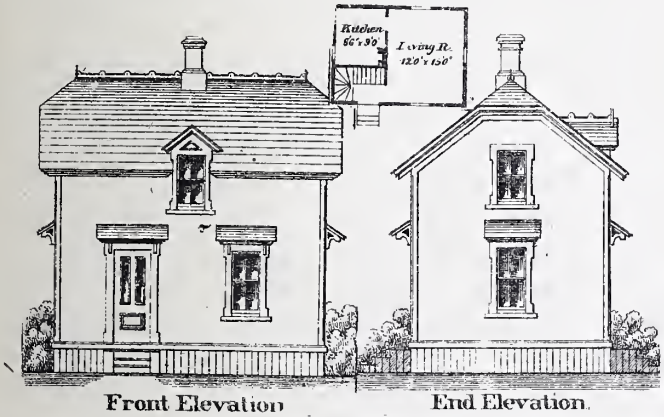


Front Elevation.

Side Elevation.

DESIGN No. 1.

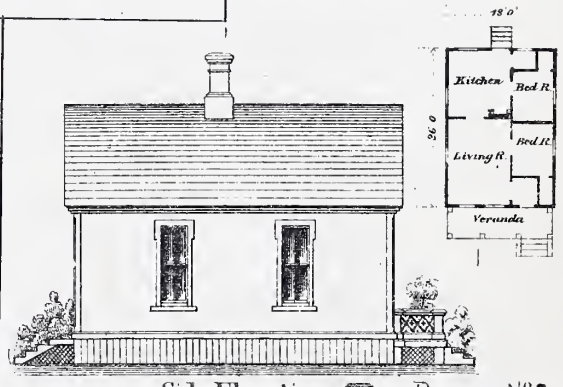
Front Elevation.



Front Elevation

End Elevation.

DESIGN No. 2

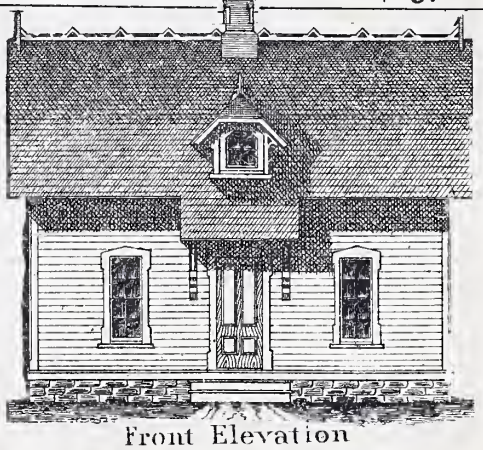


Side Elevation.

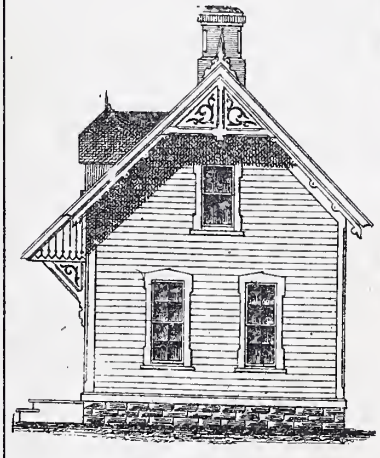
DESIGN No. 3.

DESIGN No. 5

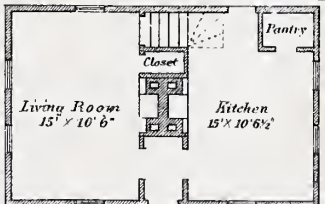
SIDE ELEVATION.

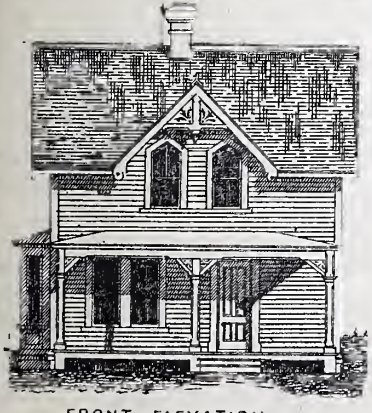


Front Elevation



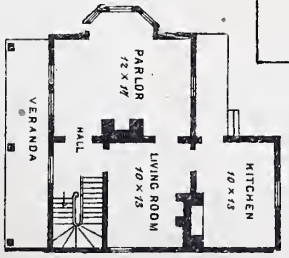
Side Elevation

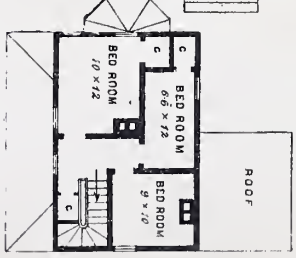




FRONT ELEVATION.

DESIGN No. 4





Cheap Houses for Mechanics

In the same manner any other point, such as *x y w v* corresponding to *f e c b*, may be found.

When the molding is returned at the upper part, such as at H F, the line H G must obviously be drawn parallel to *g o*, that is, perpendicular to the horizon. The remainder of the procedure, and the manner of finding the return of the bed-molding R S at H P, is too obvious to require further description.

Figure 2 shows a raking molding on the spring. In this the proeedure is the same as in the last, exeept that in place of drawing lines parallel to the rake, concentric eurves are deseribed to find the points in the molding. But it is neeessary to observe that it is not where the perpendieulars from A C intersect these ares that the proper points are. The true points are interseetions with tangents to the eurves where they cut the line A B.

Figures 3 and 4 show the method of describing the seetion of the raking molding on the line A B perpendieular to the raking line, and also on the line G H parallel to *g o*, in the ease where the molding is not returned, or where the two raking sides meet. These will be readily understood on inspeetion.

The Stability of Structures.

BY F. E. KIDDER, B. C. E.

VI.

CENTRE OF GRAVITY (continued).

Center of Gravity of Lines. Straight Lines.—By a line is here meant a material line, whose transverse section is very small, such as a very fine wire.

The center of gravity of a uniform straight line is at its middle point. This proposition is too evident to require any demonstration.

The center of gravity of the perimeter of a triangle is at the center of the eircle inseribed in the lines joining the eenters of the sides of the given triangle.

Thus let A B C (Fig. 1) be the given triangle. To find the center of gravity of its perimeter, find the middle points, D E and F, and conneet them by straight lines. The center of the circle inscribed in the triangle formed by these lines will be the center of gravity sought.

Symmetrical Lines.—The center of gravity of lines which are symmetrical with referenee to a point, will be at that point. Thus the center of gravity of the eircumference of a circle or an ellipse is at the geometrical center of those figures.

The center of gravity of the perimeter of an equilateral triangle, or of a regular polygon, is at the center of the inseribed cirele.

The center of gravity of the perimeter of a square, rectangle or paralellogram, is at the intersection of the diagonal of those figures.

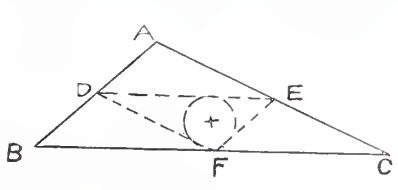


Fig. 1.

Center of Gravity of Surfaces. Definition.—A surfaee here means a very thin plate or shell.

Symmetrical Surfaces.—If a surface can be divided into two symmetrical halves by a line, the center of gravity will be on that line; if it can be divided by two lines the center of gravity will be at their intersection.

The center of gravity of the surface of a cirele, or an ellipse, is at the geometrical center of the figure; of an equilateral triangle, or a regular polygon, it is at the center of the inscribed circle; of a parallelogram, at the intersection of the diagonals; of the surface of a sphere, or an ellipsoid of revolution, at the geometrical center of the body; of the eonvex surface of a right eylinder, at the middle point of the axis of the cylinder.

Irregular Figures.—Any figure may be divided into rectangles and triangles, and, the center of gravity of each being found, the eenter of gravity of the whole may be determined by treating the eenters of gravity of the separate parts as particles whose weights are proportional to the areas of the parts they represent.

Triangle.—To find the eenter of gravity of a triangle, draw a line from each of two angles to the middle of the side opposite; the interseetion of the two lines will give the center of gravity.

Quadrilateral.—To find the center of gravity of any quadrilateral, draw diagonals and from the end of each farthest from their intersection lay off, toward the intersection, its shorter segment; the two points thus formed, with the point of interseetion, will form a triangle whose eenter of gravity is that of the quadrilateral.

Thus, let Fig. 2 be a quadrilateral whose center of gravity is sought. Draw the digagonals A D and B C, and from A lay off A F E D and B H=E C. From H draw a line to the middle of F E and from F a line to the middle of E H. The point of interseetion of these two lines is the center of gravity of the quadrilateral. This is a method commonly used for finding the center of gravity of the vousoir of an areh.

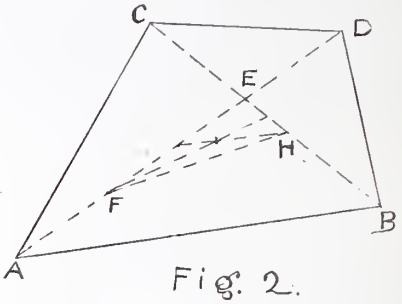


Fig. 2.

Table of Centers of Gravity.—Let *a* denote a line drawn from the vertex of a figure to the middle point of the base, and D the distanee from the vertex to the eenter of gravity. Then

In a triangle	$D=\frac{2}{3}a$
" segment of a eircle	$D=R-\frac{\text{chord}^3}{12\times\text{area}}$
" scetor of a eirele, the vertex being at the center	$D=R\times\frac{2\times\text{chord}}{3\times\text{are}}$
" semicircle, vertex being at the eenter	$D=.425R$
" quardrant of a eirele	$D=\frac{3}{5}R$
" semi-ellipse, vertex being at the eenter	$D=.425a$
" parabola	$D=\frac{3}{5}a$
In a cone or pyramid	$D=\frac{3}{4}a$

In a frustum of a cone or pyramid,
Let *h*=height of complete cone or pyramid
" *h'*= " " frustum
" v. be at apex of eomplete e. or p.

Then $D=\frac{3(h^4-h'^4)}{4(h^3-h'^3}$

The common center of gravity of two figures or bodies, external to each other, is found by the following rule:

Multiply the smaller area or weight by the distance between centers of gravity and divide the product by the sum of the areas or weights; the quotient will be the distance of the common eenter of gravity from the center of gravity of the larger area.

Example.—As an example under the above rule and tables, let us find the common center of gravity of the semi-eirele and triangle shown in Fig. 3.

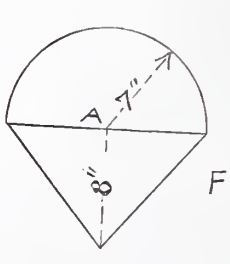


Fig. 3.

We must first find the eenters of gravity of the two parts.

The eenter of gravity of the semi-eircle is .425″ R from A or 2.975″. The c. of g. of the triangle is $\frac{1}{3}$ of 8″, or 2.666″ from A, and hence the distanee between the eenter of gravity is 2.975″+2.666″ or 5.641.″

The area of the semi-eirele is approximately $3\frac{1}{7}\times\frac{4.9}{2}$ or 81.666 sq. ins. The area of the triangle is 7×8 or 56 sq. ins.

The sum of the areas is 137.666 sq. ins. Then, by the above rule, the distanee of the eommon center of gravity from the center of gravity of the semi-circle is $\frac{56\times5.641}{137.666}=2.29''$.

or 2.975−2.29= .68 ins. from A.

RETAINING WALLS.

A Retaining-Wall is a wall for sustaining the pressure of earth, sand, or other filling or backing deposited behind it after it is built; in distinetion to a *brest*, or *face* wall, whieh is a similar structure for preventing the fall of earth which is in its undisturbed natural

position, but in which a vertical or inclined face has been excavated.

Fig. 4 gives an illustration of the two kinds of wall.

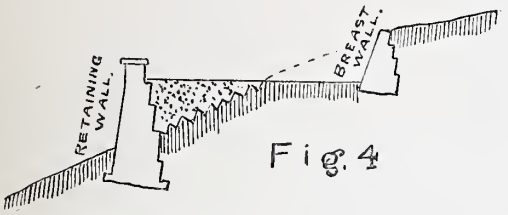


Fig. 4

Retaining Walls.—A great deal has been written upon the theory of retaining walls, and many theories have been given for computing the thrust which a bank of earth exerts against a retaining wall, and for determining the form of wall which affords the greatest resistance with the least amount of material.

There are so many conditions, however, upon which the thrust exerted by the backing depends, such as the cohesion of the earth, the dryness of the material, the mode of backing up the wall, etc., that in practice it is impossible to determine the exact thrust which will be exerted against a wall of a given height.

It is therefore necessary, in designing retaining walls, to be guided by experience rather than theory. As the theory of retaining walls is so vague and unsatisfactory we shall not offer any in this article, but rather give such rules and cautions as have been established by practice and experience.

In designing a retaining wall there are two things to be considered—the backing and the wall.

The tendency of the backing to slip is very much less when it is in a dry state than when it is filled with water, and hence every precaution should be taken to secure good drainage. Besides surface drainage there should be openings left in the wall for the water which may accumulate behind it to escape and run off.

The manner in which the material is filled against the wall also affects the stability of the backings. If the ground be made irregular, as in Fig. 4, and the earth well rammed in layers inclined *from* the wall, the pressure will be very trifling, provided that attention be paid to drainage. If, on the other hand, the bank be tipped in the usual manner in layers sloping *towards* the wall, the full pressure of the earth will be exerted against it, and it must be made of corresponding strength.

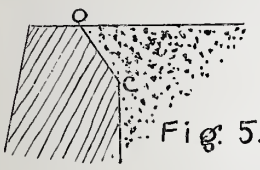


Fig. 5.

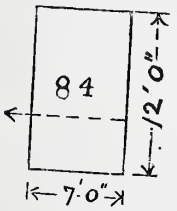


Fig. 6.

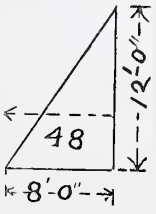


Fig. 7.

The Wall.—Retaining walls are generally built with a battering (sloping) face, as this is the strongest wall for a given amount of material; and if the courses are inclined towards the back, the tendency to slide on each other will be overcome, and it will not be necessary to depend upon the adhesion of the mortar.

The importance of making the resistance independent of the adhesion of the mortar is obviously very great, as it would otherwise be necessary to delay backing up a wall until the mortar was thoroughly set, which might require several months.

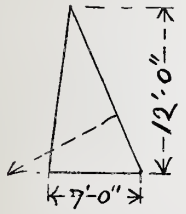


Fig. 8.

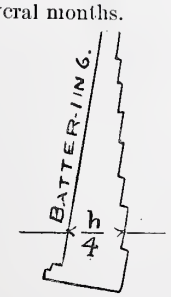


Fig. 9.

The Back of the Wall should be left Rough.—In brickwork it would be well to let every third or fourth course project an inch or two. This increases the friction of the earth against the back, and thus causes the resultant of the forces acting behind the wall to become more nearly vertical, and to fall farther within the base, giving increased stability. It also conduces to strength not to make each course of uniform height throughout the thickness of the wall; but to have some of the stones, especially near the back, sufficiently high to reach up through two or three courses. By this means the whole masonry becomes more effectually interlocked or bonded together as one mass, and less liable to bulge.

Where deep freezing occurs the back of the wall should be sloped forwards for 3 or 4 feet below its top, as at *o c*, Fig. 5, which should be quite smooth, so as to lessen the hold of the frost and prevent displacement.

Figs. 6, 7, 8 and 9 show the relative sectional areas of walls of different shapes that would be required to resist the pressure of a bank of earth 12 feet high (Art of Building; E. Dobson, pp. 20). The first three examples are calculated to resist the maximum thrust of wet earth, while the last shows the modified form usually adopted in practice.

Rules for the Thickness of the Wall.—As has been stated, the only practical rules for retaining walls which we have are empirical rules based upon experience and practice.

Mr. John C. Trautwine, C. E., who is considered authority on engineering subjects, gives the following table in his *Pocket Book for Engineers*, for the thickness at the base of vertical retaining walls with a sand backing deposited in the usual manner.

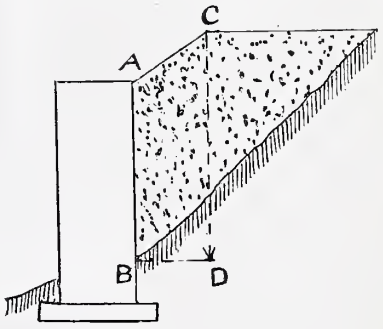


Fig. 10.

The first column contains the vertical height, C D, Fig. 10, of the earth as compared with the vertical height of the wall; which latter is assumed to be 1, so that the table begins with backing of the same height as the wall. These vertical walls may be battered to any extent not exceeding 1½ inches to a foot, or 1 in 8 without affecting their stability and without increasing the base:

PROPORTION OF RETAINING WALLS.

Total Height of the Earth compared with the Height of the Wall above ground.	Wall of Cut Stone in Mortar.	Good Mortar, Rubble or Brick.	Wall of good, dry Rubble.
1	.35	.40	.50
1.1	.42	.47	.57
1.2	.46	.51	.61
1.3	.49	.54	.64
1.4	.51	.56	.66
1.5	.52	.57	.67
1.6	.54	.59	.69
1.7	.55	.60	.70
1.8	.56	.61	.71
2	.58	.63	.73
2.5	.60	.65	.75
3	.62	.67	.77
4	.63	.68	.78
6	.64	.69	.79

Brest Walls.—(From Dobson's *Art of Building.*) Where the ground to be supported is firm, and the strata are horizontal, the office of a brest wall is more to protect than to sustain the earth. It should be borne in mind that a trifling force, skillfully applied to unbroken ground, will keep in its place a mass of material which, if once allowed to move, would crush a heavy wall; and, therefore, great care should be taken not to expose the newly opened ground to the influence of air and wet for a moment longer than is requisite for sound work, and to avoid leaving the smallest space for motion between the back of the wall and the ground.

The strength of a breast wall must be proportionately increased when the strata to be supported inclines towards the wall; where they incline from it, the wall need be little more than a thin facing to protect the ground from disintegration.

The preservation of the natural drainage is one of the most important points to be attended to in the erection of breast walls, as upon this their stability in a great measure depends. No rule can be given for the best manner of doing this; it must be a matter for attentive consideration in each particular case.

Society of Architectural Iron Manufacturers.

THE above is the title of a society which has recently been established in this city for the purpose of advancing the interests of the architectural iron trade, and with the view of promoting frequent interchange of ideas relating to the manufacture of the same. At a meeting held on May 16, the following officers

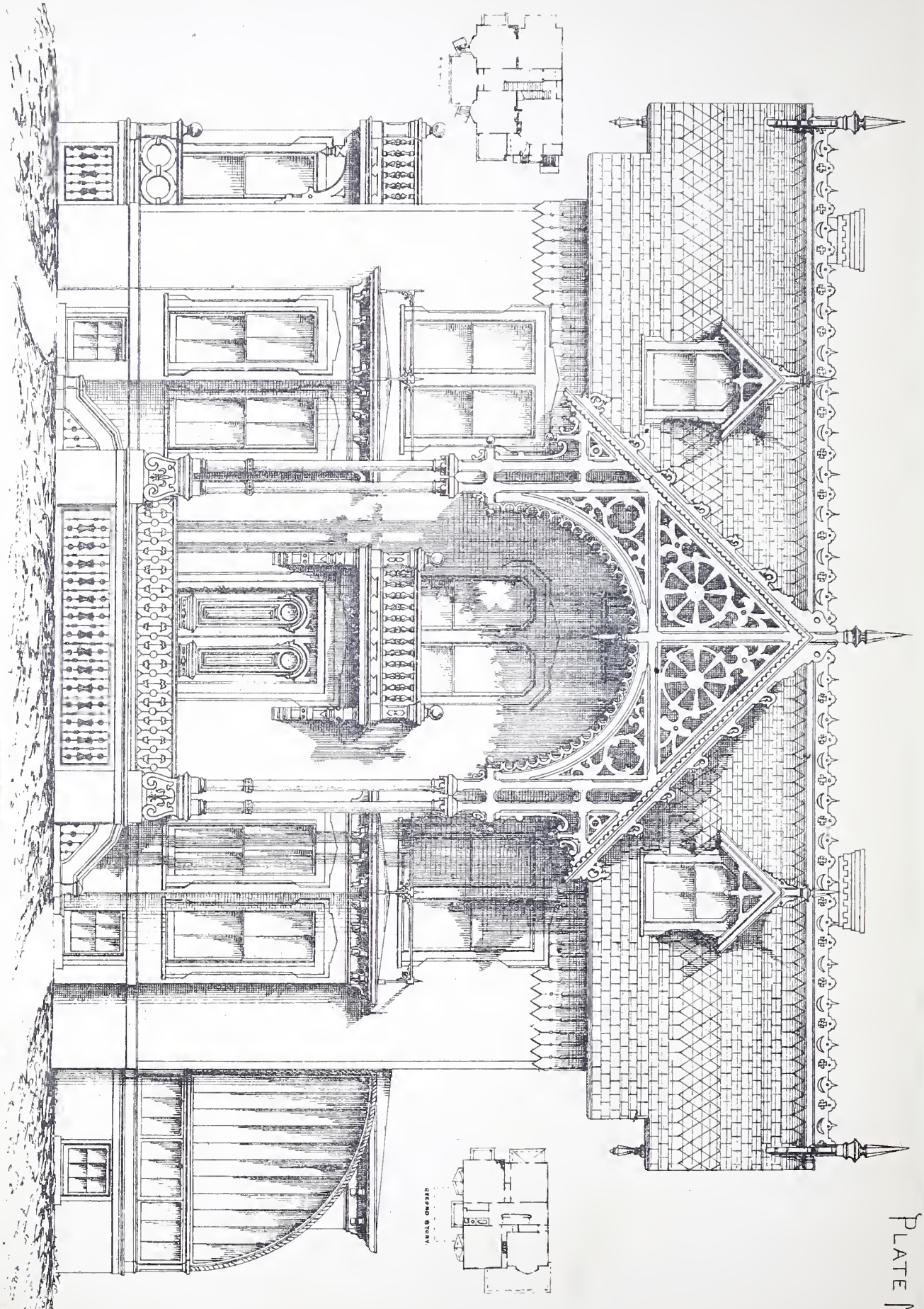
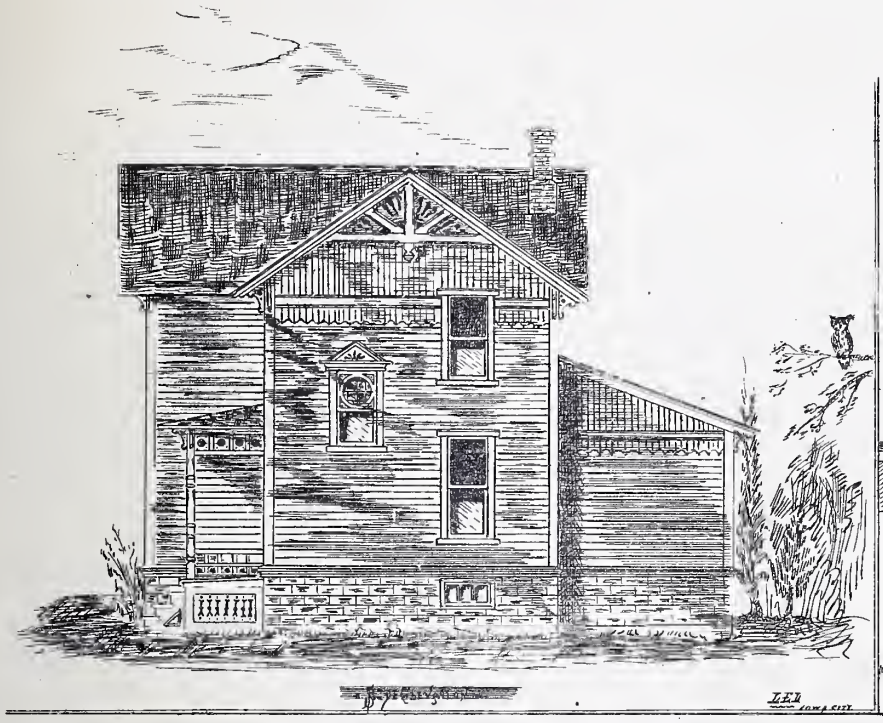
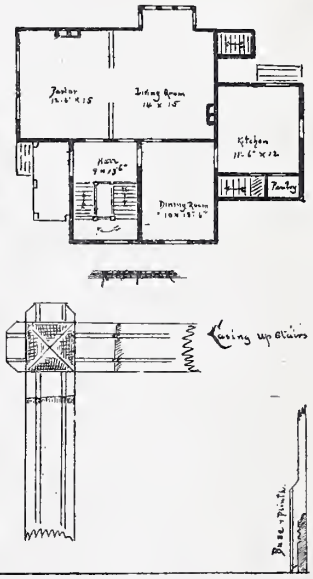
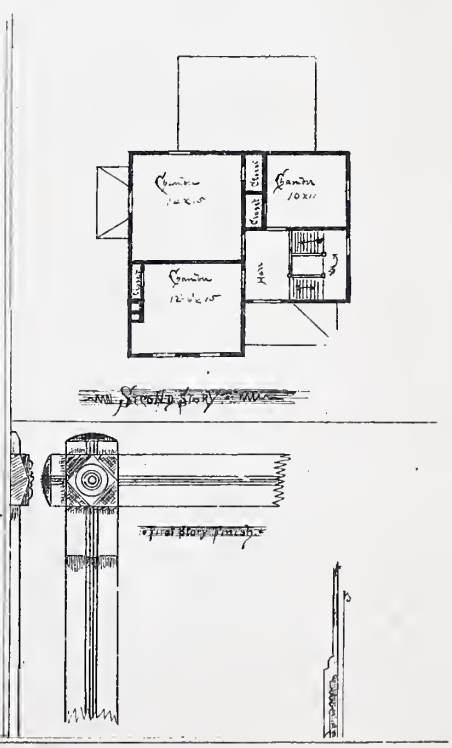


PLATE No. 42

PLATE No. 43




Parlor
Dining Room
Kitchen
Hall
Pantry
Dining Room
Basement Plan


Chamber
Chamber
Chamber
Hall
Second Story Plan

were elected: President, J. B. Cornell; vice-president, J. J. Burnet; secretary, A. J. Campbell; treasurer, Thos. Radley. An inspection of the constitution of the society shows that all persons engaged in the manufacture of ironwork for buildings in the city and vicinity, may, after being proposed and elected, become members on signing the constitution and paying an entrance fee of $25. Certificates of membership, which are to be transferable, will be issued, and each certificate shall represent an equitable share in the money and property of the society. Meetings will be held on the second Monday in each month, excepting July, August and September. It appears that the society will not attempt to fix wages or selling prices, and every member shall be entirely at liberty to employ whomsoever he may desire, and for whatever compensation he may deem best. The funds of the society at the present time amount to some $800, and it will probably not be long before important additions will be made, both in influence and property.

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor of the BUILDER AND WOOD-WORKER:

In your last issue I notice that B. T. E., of Somerville, N. J., asks some questions about wood turning; with your permission I will endeavor to answer his questions; but before doing so I will just say that if B. T. E. will visit some shop where wood turning is done, and watch the operation and operator for a half an hour, he will learn more in that time than I or any other one can teach him, if we write him on the subject from now until doomsday.

In answer I may say: (1.) The wood is simply left with a square section. If for 2-inch work, the piece is left a trifle over 2 inches square in section, and so on with all other sizes. (2.) Both hands are used to hold the tool and guide it. The wood revolves in the lathe, and the tool is pressed against the wood while in rapid motion, at certain angles which the expert finds by instinct almost. (3.) The design is not applied to the work; only the measurements are applied. The drawing is kept before the operator, and he forms the work purely by the "eye."

The expert will turn out balusters or other work by the hundred, and so near alike that none but the keenest eye can be able to distinguish any difference between the several pieces. JONES.

BROOKLYN, N. Y., May 16th, 1882.

Editor of the BUILDER AND WOOD-WORKER:

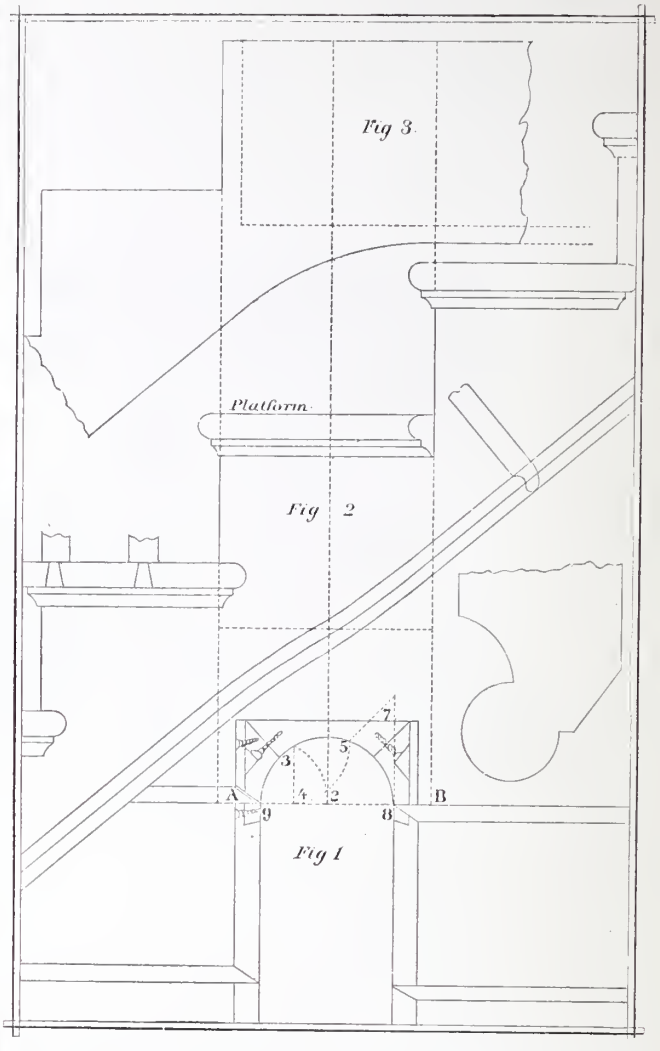
Perhaps it is hardly worth while replying to the strictures of "John, of Jersey," but as I take such an interest in the BUILDER AND WOOD-WORKER I am constrained to say a few words in justification of the course I have taken in answering some of the queries which appear from time to time in your valuable columns. It is quite true, that in replying I have used matter and ideas that have been used over and over again by others, and it is just on that account that I have used it, because such information is much better than any I could possibly give otherwise. That I don't give credit is simply because, in a great many cases, I do not know where to place the credit, as I frequently find the same thing attributed to half a dozen sources. Such was the case with the item "John, of Jersey," takes exception to. I had seen the article nearly word for word in an English publication, several years before the journal he refers to had an existence; but this is neither here nor there, as I take it the inquirer does not care a cent about the sources of information so long as the information is given and is correct.

Time is precious to me, and whatever I send to "our journal," though sent with pleasure, is more or less a tax upon me; and as I seek for neither fame or reward, but do it solely in the interest of my fellow readers, I think it unfair for "Jersey John," or any other reader, to find unnecessary fault so long as you, sir, are willing to accept my humble offerings. ADEPT.

Editor of the BUILDER AND WOOD-WORKER:

I herewith send you drawings and descriptive matter for the construction of straight and platform stairs, and which I think will prove useful to many of your readers:

To build stairs, the workman will first get the size of the room, and the height of the story, which determines the width of the steps and risers; the length of which, and the size of the opening, are a matter of taste or convenience.



The cylinder is staved up and secured with glue and screws. The string pieces are secured to the cyliuder in the same manner. To find the development or stretchout of the cyliuder (Fig. 1), describe the arcs 2, 3, and 4, 5, from the point 5, draw the diagonal 5, 7, at an angle of 45°, then 7, 8, equals one-half of the semicircle that forms the cylinder; set off from 2 to A and B equal to 7, 8; draw the elevation of the steps and risers Fig 2, below and above the platform. Then the front string piece should be wide enough to receive suitable width of timber to support the stairs. From the casing on the stretchout of the cylinder which completes the elevation of a platform stairs.

Fig. 3, is an elevation of the cylinder and casing for a straight flight of stairs. The back string piece should be mortised about five-eights of an inch deep, and large enough to receeive wedges, glued to secure the steps and risers.

The workman should, in all cases, imagine that he sees what he wants, and can do it. Now suppose we place the center of the cylinder Fig. 2, over the center of the plan, then bring the lower and upper string piece around until the lines from A and B stand over the points 9 and 8 and the steps correspond with the steps on the plan, which will be the case if executed according to the drawings.

NEWARK, N. J., May 14, 1882. L. D. G.

Editor of the BUILDER AND WOOD-WORKER:

I am hard at work making a couple of brackets from designs furnished in your valuable journal. Now I wish you to inform me at your earliest convenience, how I can ebonize them and make a good job to compare with professional work. In making I use white pine. Please answer in your columns.

I was only introduced to your monthly offering a few months ago, and now derive great pleasure from it; my only objection to it being my not hearing of its existence sooner. Yours truly,

BROOKLYN, N. Y., May 10th, 1882. "AMATEUR TINKER."

Increased Cost of Building a House.

IT appears from careful calculations which have been made for us by leading architects and builders that the cost of building a

house is from 10 to 15 per cent greater to-day than it was a year ago. That is to say, a domicile which would have necessitated an expenditure of $20,000 to build in the spring of 1881 will require an outlay of $22,000 to $23,000 in 1882, and one which cost $2,000 in 1881, will cost $2,200 to $2,300 in 1882.

The most marked advance this spring has been in the matter of labor. The following table shows the wages of skilled and unskilled workmen to-day and a year ago, with the percentage of advance :

	1882.	1881.	*Advance.*
Carpenters, per day	$2 50	$2 00	25 per cent.
Bricklayers, face	3 25@3 50	3 50@3 25	8 "
" com	2 75@3 00	2 50@2 75	10 "
Stonemasons	3 00@3 50	3 00@3 50	None.
Hod carriers	1 75@2 00	1 75@2 00	None.
Plasterers' tenders	2 00@2 25	2 00@2 25	None.

It will be seen that the wages of carpenters have risen in greater ratio this spring than those of other mechanics or laborers. This is due to the fact that activity in real estate has largely extended into the suburbs this spring, and an increased number of wooden houses are consequently being erected. The wages of stone masons were maintained on a full basis a year ago by a very strong union which exists among the journeymen in that trade. The wages of hod carriers and other unskilled laborers were also advanced earlier than those of carpenters. Our quotations of the present wages of the last-named artisans represent the average prices paid by leading builders. Some common "wood-butchers" are hired at $2.00 per day, while superior workmen receive as high as $3.00.

The following table shows the prices which builders are paying for leading classes of lumber, doors, windows, etc., now as compared with the corresponding date of 1881. These, of course, are not wholesale rates, but are the prices which are paid for stock delivered at the place where it is to be used :

	1882.	1881.	*Advance.*
Pine, good finish	$53 00@60 00	$50 00@55 00	6@ 9 per cent
Pine, com. shelving	38 00@44 00	35 00@40 00	8@10 "
Spruce dimensions ₱ M	17 00	$16 50	3 "
Spruce, upper floor, clear	30 00	28 00	7 "
Spruce clapboards, extra	34 00	33 00	3 "
Spruce, laths	2 00	1 75	14 "
Doors, 2 ft. 8 in. x 6 ft. 8 in. and 1¼ in. thick, No. 1	2 50	2 39	8 "
Windows, 15x30 in. and 1½ in. thick, 4 lights of glass	1 60	1 50	6⅔ "
Windows, 10x12 x 4½ 12 lights	1 12	1 05	6⅔ "
Blinds, 15x30, half roll, No. 1	90	80	12½ "
Blinds, 10x12, stationary, No. 2	62	55	12½ "

It appears, therefore, that the advance in the various kinds of lumber has ranged from 3 to 12½ per cent. since a year ago. Of course a comparison with the depressing quotations of the era previous to 1879 shows a much larger ratio of increase. The advance in windows this year will be seen to be about 6⅔ per cent., but the glass alone has risen about 10 per cent.

The comparative prices of bricks, lime and cement now and a year ago are as follows :

	1882.	1881.	*Advance.*
Bricks, com	$10 00@11 00	$9 50@10	5@10 per cent.
Bricks, Boston, face	20 00@21 00	17 00@18 00	16@17 "
Lime	1 15	85	35 "
Cement, Newark	1 50	1 30	15 "

Here are quotations of a few leading articles of hardware now and a year ago :

	1882.	1881.	*Advance.*
Nails, per keg	$3 50	$3 15	11 per cent.
Hinges, 3x3 loose butts, per doz	88	80	10 "
Locks, iron face bolt, per doz	2 12	1 83	17 "
Mineral knobs, common, per doz	1 00	1 00	None.

—*Manufacturer and Builder.*

The American Workingman.

DR. LYON PLAYFAIR, one of the most prominent of English-men of science, and a member of Parliament, who has lately returned to his native country from a tour in the United States, has published some of the results of his observations of men and things in this country, which convey some very instructive and suggestive statements bearing upon the industrial future of the United States. Coming as they do from a representative Englishman, of large views, thoroughly competent by reason of his intimate familiarity with the industries of his own country, and favored with every facility for obtaining accurate information, Mr. Playfair's opinions are of special interest.

Mr. Playfair publishes in a recent number of *Macmillan's Magazine*, a paper entitled "Industries of the United States in Relation to the Tariff," in which we find some material for future consideration, and some comments on the position of the workingman in the manufacturing States, which last specially interests us here. We shall give, therefore, in the following a brief summary of the author's impressions on this subject.

Mr. Playfair states that the true American mechanic, by descent, education and training, is excellently adapted to his work. His chief center is in New England, though he is rapidly spreading everywhere. The original settlers in New England were men of strong will, and above the average of the old country in education and enterprise. Their early love for education is shown in the fact that soon after their settlement, they established Harvard College. These men landed on a rough, inhospitable coast, covered with wood, and they had few tools with which to conquer nature. They were obliged to be men of many resources. In possession perhaps of a single tool, they turned it to many purposes, and if it did not suit, they altered it. This reliance, inventiveness and industrial application developed together.

The soil of the New England States is the poorest for agricultural purposes, while the climate is not sufficiently changeable for a large variety of crops. The rocky and poor soil upon which the early settlers landed, forced the increasing population into manufactures and commerce, so that they acquired habits of industry and thrift. As they gradually extended westwards and southwards, better climate, land and raw material opened up new sources of wealth, and the qualities acquired by the first colonists enabled their descendants to take advantage of improved conditions.

The New Englanders never forgot that their superior education had been of powerful assistance to them as early settlers, and they kept up knowledge among their descendants. It is a rule among Americans that the school house must precede the factory, and that capital applied to industry without knowledge is worthless.

Even the Puritan sense of religion, Mr. Playfair believes, has had great effect on manufactures. The commandment, "Thou shalt not steal," is carried out in manufactures. When cotton goods are sold, the material is wholly cotton, and is not weighted with China clay or sulphate of baryta. The 600,000 muskets sent out to Turkey during the war, were made to shoot and not to sell.

American goods, he affirms, are dear, but they are true and good. The example of New England spreads over the Union, and has produced an honest and efficient workman everywhere. The high price of labor gave a great stimulus to the invention of labor-saving machinery, while the patent laws wisely encouraged inventions.

Thus, the true American mechanic is generally superior to, though not dearer than, the mechanics who enter by immigration. He is too dear for inferior work. But even in the case of imported labor, American industry has a great advantage over other countries. The emigrant arrives in the full power of production, while the country which sent him forth had to pay for his childhood during the years in which he possessed no productive value.

THIS department is intended to furnish, for the benefit of all our readers, practical information regarding the art of building or manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the NUMBER and TITLE of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn IN INK ON CLEAN, WHITE PAPER. Short questions, requiring short answers, may be asked and answered through the agency of postal-cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

Questions.

53. DAIRY.—I am about to build a dairy for a well-to-do farmer in this locality, and as I am not confined to expense—providing the cost is not unreasonable—I would like to get a few hints as to the requirements, construction, and fitting up of a first-class Dairy?—COUNTRY BUILDER.

54. PROPORTIONAL COMPASSES.—I should be pleased if "Adept," or some other equally well-read contributor would explain the use of "Proportional Compasses," and give such information as would be considered of service to a young draftsman?—JOHN B.

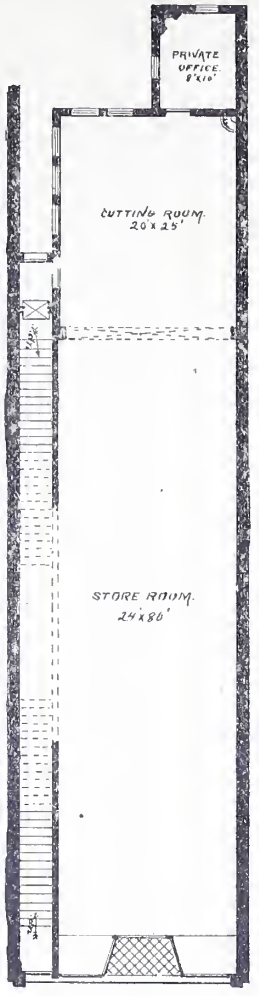
55. BOILER CHIMNEYS.—Is there any rule for proportioning chimneys for steam boilers? I have several chimneys to build this season and would be glad of any information on the subject.—PITTSBURG BRICKLAYER.

56. COLORING DRAWINGS.—Will some one give me, through these columns, a few hints regarding the coloring of drawings, also inform me of the titles of such books as would be the most useful for an old carpenter to purchase, who wishes to become able to make his own drawings? I can work after any correct drawing, and thoroughly understand the use of scales, etc.—CHIP.

57. PLUSH PANELS.—How is the plush, velvet, or silk, fastened on door panels?—JOINER.

PLATE Nº 44

ALTERNATIVE DESIGNS FOR STORE FRONT, FOR C. HESS, ESQ. WHEELING, W. VA.



1st STORY PLAN.

S. M. HOWARD. ARCHt
WHEELING, W. VA.

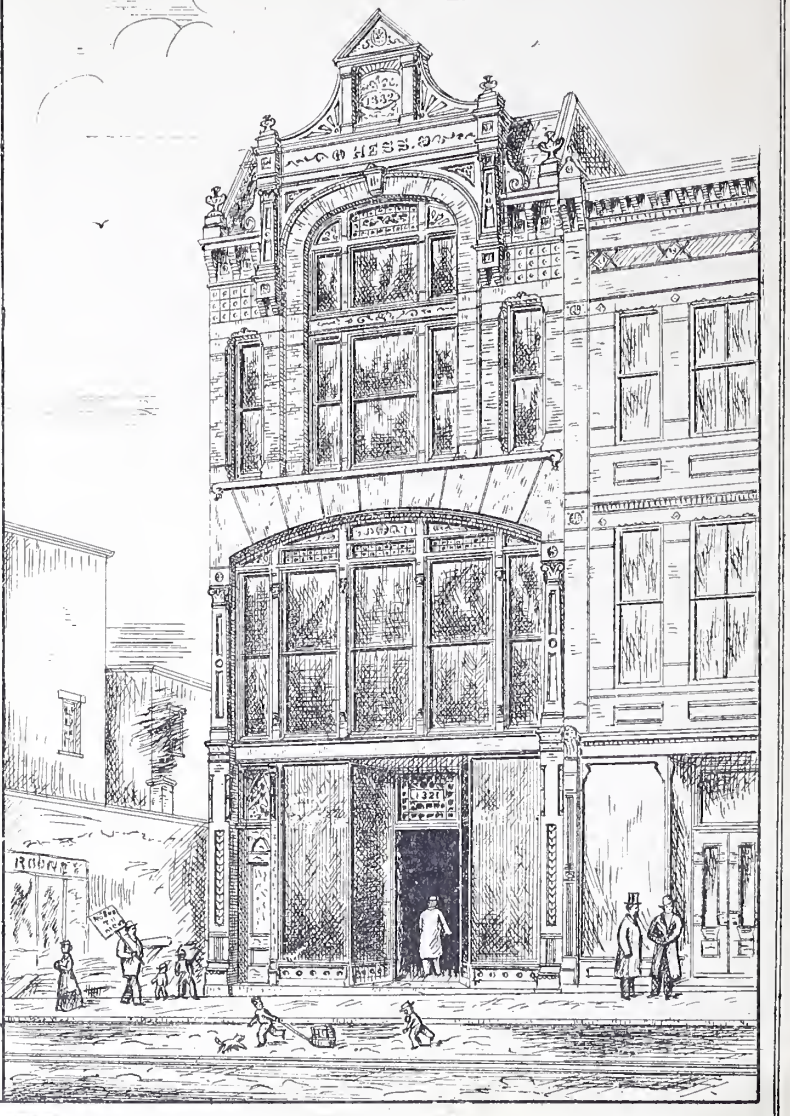
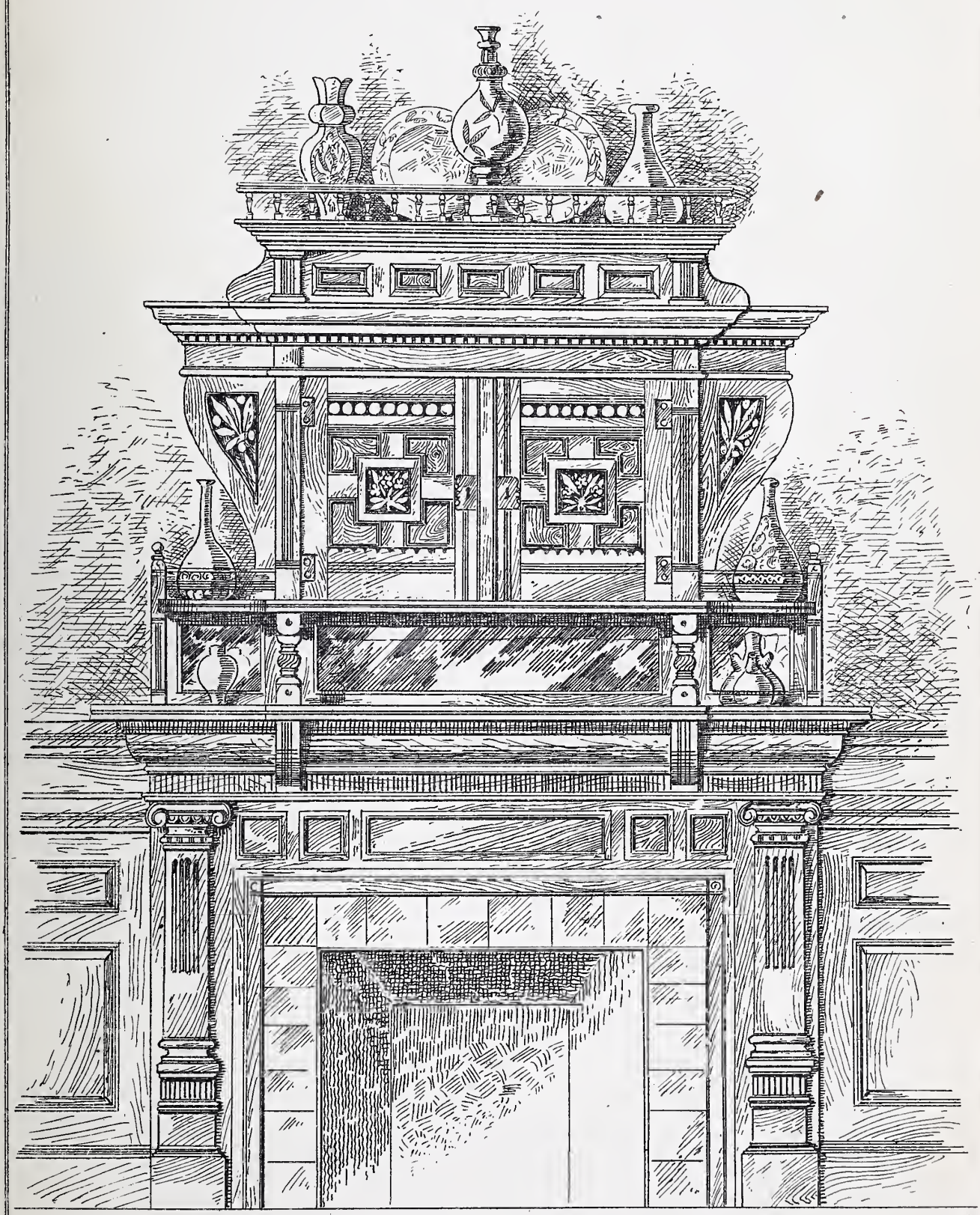


PLATE No. 45



DINING R. MANTEL.

EDWARD DEWSON, ART DESIGNER.
28 STATE ST. BOSTON.

58. WOOD FOR FURNITURE AND INSIDE FINISH.—I am building a house in this city—Cincinnati—which is to have all the lower story finished in hardwood and Georgia pine. The furniture is to be made in the house by the workmen now engaged. The owner—who is superintending the work himself—finds it difficult to determine on the kind of wood to use in each room. Now, I shall feel obliged if any reader of your valuable paper will give me any information about the selection of hard woods, and the position they should occupy in the building I speak of. The cottage is built in a kind of Queen Anne style.—BUILDER.

59. BOOKS.—Will some one, who knows, state where "Wood Carving" by Major Seaton, and Rogers' work on carving can be obtained, also the prices of same?—E. H.

60. VENTILATION.—I would be glad if some brother reader would explain the "Ruttan system of ventilation," and if it is considered superior to any other system?—"RAMBLER."

61. DRAWING.—Will "Adept," or some other reader publish a few hints on color and how to apply it to the paper; what kind of color to use to represent stone, brick and wood. What kind of brush to use, and how to prepare the color for work; and is there any other instrument used in coloring but the brush, and how is the color kept from running over the lines?—H. B. B.

62. INDIAN INK.—Would some practical draftsman inform me through the columns of this journal how to prepare "Indian Ink" for working so as to make a bold strong line? What is the cause of it having a faded delicate appearance, is it bad ink, or is it the fault of not preparing it right? I have rubbed it as heavy as it would carry, but it still has that dead, weakly appearance. I know that it is not jet black but a brownish color. What I want is a strong bold line and as black as possible. Some light on this subject will be welcomed by H. B. B.

Answers.

WE wish it distinctly understood that we do not hold ourselves responsible for the accuracy or reliability of answers furnished to this department by our correspondents.

We cordially invite our readers to take an active part in this department, as we are confident that much good can be accomplished by a free interchange of ideas and opinions in regard to subjects connected with building and woodworking.

Many persons are afraid to write to a public journal because of their lack of literary attainments; to such we would say: Give us your ideas in such language as you can command, and leave the rest to us. It is ideas and opinions we want, such as may be of use to the architect, the amateur, and the workingman. Answers should be sent to this office on or before the fifteenth of each month, to insure insertion in the next issue.

48. ARCHITECTURE.—If A. A. P. will examine the advertising pages of some of the back numbers of the BUILDER AND WOOD-WORKER, he will find the information he asks for.—NEFF.

49. PHOTOPHONE.—This was a discovery made by Mr. Graham Bell, the well-known inventor of the "Bell Telephone." By its means sounds may be transmitted to long distances through the agency of a beam of light, without the use of wires or tubes. Like many other wonderful things it is almost ridiculous in its perfect simplicity, consisting merely of a plane mirror of thin silvered glass or mica, to the back of which the operator speaks. A beam of light, from the sun or other source, is concentrated upon the mirror by a lens, and the vibration given by the voice to the mirror is taken up by the beam of light and transmitted to the distant station, where the light is concentrated by a parabolic reflector upon a disk of thin hard rubber which closes one end of a hearing tube. On placing the other end of the tube to the ear the exact reproduction of the voice is heard. A plate of selenium placed in the circuit of a battery and connected with a telephone may be used in place of the rubber disk and tube.—ADEPT.

50. DOORS.—Two things are to be considered in the design of a door; the first is its aperture, and the second its ornaments. These must both enter the mind of the architect who is designing an edifice, or he will never proportion or adapt it to the structure. How often do we see doors which appear not to belong to the house, but to be joined to it against nature, not raised with the building. It is common to see doors whose breadth occupies near one-half of the extent in front. This is the error of those who mean to be magnificent; but the opposite is too common in plain houses. Doors are put which seem to say, no fat man comes into this house, and they always disgrace the whole building.

The variations in the antique are in this instance very great; and from this it was that Palladio evaded giving rules for the dimensions of doors in proportion to houses. He was sensible he could lay down none against which some instance might not be brought, in those buildings which were allowed masterly in their kind; and he therefore left it undetermined. There are many things in which the ancient architects have erred, and it will be a double error in us to copy their faults. They did not in general make the aperture equal all the way, but contracted it upwards. This must have had a strange effect. A door narrower at the top than the bottom must have appeared a deformity in any building. The limits of these things are not fixed at any certain point, nor are the powers of genius fettered by such boundaries. While we admire the dignity of the Grecian or the pomp of the Roman doors, let us see also this contraction as an egregious error, and if we refer to Palladio, or to the oracle of Palladio, Vitruvius, on this account, let it be to dissent from their opinions. With regard to the Italians, he was lost in the diversity of what he read, and what he saw; as to the Roman, he seems to have received it as a law in the science, that there should be this contraction: and when he directs that in doors of more than thirty feet heighth in the opening, there should be no contraction of the diameter, his commentator Philander, who rarely misses his sense, says this was, because at that heighth the nature of vision answered the same purpose and the contraction was given to the eye by distance.

The architect will see by this free disquisition, that the ancients are not proper instructors in the dimensions of doors; how much soever we may learn from them respecting their ornaments. He will see also, that the most famous of the moderns has left him uninformed on this head: and if he looks into the common books of design he will find nothing but absurdity.

With respect to the height of doors in the aperture, there is an universal law in reason, though not observed; there is a certain height below which they must not be though for dignity and proportion the field in which they may exceed is almost unlimited. The human stature is the mark for the least height that can be proper; he who makes a door is not to descend below this established proportion. For the lowest door then the height must be such as that man of the highest common stature may go through it without stooping. This limits the measure to six feet; below this the door of no house should be made, even of the plainest; but all above is left to fancy guided by the general idea of proportion.

The height being thus determined, the breadth comes into consideration; the sides must be so distant, that they must not reduce a man to enter with his arms in any particular posture; as he is to go in without stooping, so he ought to be able to walk in at ease. The smallest dimensions therefore in breadth that can be allowed is two feet ten inches, and this being half of the given height has a very good effect in respect of general proportion.

These are the rules laid down by nature, and these being allowed as truth, become the foundation of all the other proportions. While we are near this, we are sure not to err, and this ought always to be kept in remembrance for that purpose. He would have reason to complain of the confined laws of science, who fancied that from this every door must be made the exact double of its width in height; there are peculiar constructions which require particular measures, but as in all other cases there are bounds which must not be transgressed, so in these there is a latitude, as we shall show, within which the fancy may rove, but which it must not pass. We have said, that for the plainest doors the proportions of height to breadth must be double; this is to be a little varied at the pleasure of the architect, and he must thus employ his liberty.

Last of all we come to the structure of the fabric of the door itself; this should be contrived for strength, beauty and straightness. All these purposes are answered by making in many panels. The folding or half doors are best made of four panels, two larger and two smaller, and the entire door of eight. The framing must be sound and the joints well secured. They may be varied in form many ways; but to be minute in these shows a poorness of genius in the architect. The best form of the panels is the plainest, and this is a long square; the two or four larger should be long upwards, and the other cross wise. This is a construction that shows strength and firmness, and this is all that should be consulted here, the decoration belonging to the other parts.—*Student.*

50. DOORS.—In reply to query No. 50, would say that there is no rule for the proportions of doors; the best plan is to use one's own taste. I generally make the height of my doors about nine-twelfths the height of the room and the width four-tenths the height; this rule I find works well in almost every case, J. L. N.

51. CEMENT PLASTER should be thoroughly dry before the paint is applied.—J. L. N.

51. PAINTING CEMENT PLASTER.—A great difference of opinion prevails respecting the question of painting cement, and I have seen work painted a few weeks after the cement has set, which has stood well. There is one point which has a great deal to do with the question of successful painting, namely, the absorbency and dryness of the brickwork itself. Many new walls, saturated with moisture, are cemented, and in this condition no paint can possibly stand if laid on too soon. It is a good and safe rule to enforce that cement work should not be painted within a year of its completion, to allow it to dry thoroughly; but I am safe in saying the majority of new work is painted before it has been finished three months. A very desirable precaution seems to be to coat the work with linseed oil first.

The painting of plaster work requires the same care, and the lime works out in small bubbles, destroying the paint. In painting plaster, white lead and linseed oil, with a little drier, is recommended by one authority. This coat should be of the consistence of thin cream, so that the oil is absorbed into the plaster in a few hours. In a day or two another thicker coat may be applied, and a third a few days after rather thicker, followed by the finish-

ng coat. Four coats are not too much for good work. By the absorption of the oil into the plaster the surface becomes hardened, and may be washed. Another method to facilitate this absorption is followed by painters, which is to give the plaster two or three coats of boiling linseed oil, and then to apply the other coats of paint. I am inclined to think the application of the oil before the paint a better plan, to insure a thorough saturation of the material. The color of cement and the uneven tints it sometimes assumes, is the main reason why painting it is resorted to. For this reason I think it may be worth the attention of manufacturers to turn their consideration to the subject, and those using cement as a stucco might also prevent a blotchy and uneven tint by attending to the preparation of the wall and the sand they use with the cement.—ADEPT.

[Several answers are held over until next month.—ED.]

Obituary.

ROBERT RIDDELL.

WE regret to announce that on Sunday, the 12th of March, at the good round age of 74 years, Mr. Robert Riddell, the author of several works on stair building, suddenly expired at his residence, No. 1214 Hancock st., Philadelphia.

Perhaps no man since the death of the great Peter Nicholson, has done so much to instruct the operative carpenter and joiner in the mysteries of their various callings, as the subject of this notice did during his long and busy life. His system of hand-railing is known all over the world, wherever the English language is spoken, and though dead, his work will live after him so long as industrial literature exists. Mr. Riddell was a practical workman, and knew what it was to handle the hammer and plane, and some of his handicraft remains to testify to his thoroughness and skill as a workman. He was an extensive traveler, and wherever he went he left monuments of his skill after him; in England he constructed the great staircase for the London Exhibition Company; and we believe the last work of his hands was the building of the grand suspension stair-case on George street, Sidney, Australia, in 1863. He was a frequent contributor to our pages, and has frequently replied by letter to many "queries" that have appeared from time to time in these columns; and his kindliness and consideration towards the younger members of the trade will long be remembered by many who read this notice. For some time past Mr. Riddell has been employed, by the City of Philadelphia, to teach the artisan's classes in the public schools, and his efforts have borne good and lasting results. He has frequently been remonstrated with about overworking himself; but, like a true soldier, he always replied that while there was work to be done and he was able to do it, it gave him pleasure to work on; and so he did work on, until with arms in hand, he quietly went to his everlasting rest.

He leaves a widow, three sons, and two daughters.

Fine Public Buildings.

SOME fault has been found with Congress because of the liberal appropriation for fine buildings in various parts of the country. If, however, there is a surplus of money, it could not be much better employed than in constructing handsome edifices. Our post offices, custom houses and court buildings should be structures worthy of what is destined to be the most powerful nation on the face of the globe. In eighteen years the United States will have as large a population as Germany and France combined, and there will be no richer nation potentially on the globe. The federal government does not come in immediate contact with the people except through custom houses and post offices, and it is desirable that our voting population should be duly impressed by the wealth and importance of the country to which they belong. There is no justification for any waste or extravagance, but it is manifestly unwise for federal buildings in any of the States to be cheap or mean structures. New York ought to have a superb custom house, the finest in the world; a great emigrant depot should also be established in this city under the direct auspices of the federal government, for immigration is not a local but a national matter. Let Americans, wherever they go, see in every large city evidences of the might of the country to which they belong. In Athens, in its glory, architects, sculptors and artists were not permitted to work for private persons. The State monopolized their services and the government of the United States should be the especial patron of architects and builders of the better class.—*Real Estate Record.*

Recent Improvements in the Mechanic Arts.

[Written for the BUILDER AND WOOD-WORKER by J. B. BROCK, Solicitor of Patents, Washington, D. C.]

IMPROVED SIDE-WALK DOOR.

THIS improved cellar-door consists of double doors counter-weighted. They are pivoted at the angle of the depending portions, so as to form a rear extension to the hinges. A weighted latch on each door provided with an external handle engages a projection on the side of the door opening, and is locked by a bolt from the adjacent building.

PLANING THIN PIECES OF WOOD BY MACHINERY.

The improvement in this machine consists in the plane-stock and attachments. It comprises a yoke to which the plane-stock is pivoted, and which is borne against by a spring underneath the table, thus causing a substantially equal yielding of both the knife and the stock at each end.

PAINT BURNER.

This apparatus for burning paint combines in its structure a can provided at its bottom with a horizontal projecting tube carrying the burner. Another tube extends centrally and vertically through the can, and connects with the tube at the bottom of the can, and the mouth or extension at the top thereof, where it is provided with a stop-cock.

MANUFACTURE OF FLOOR CLOTH.

In this late improved process colored patterns are produced from compounds composed of oxidized oil with other materials and colored to varied colors—that is to say, by the colored compounds being first reduced to a granulated form, then built up separate the one from the other into colored patterns or devices, and afterward consolidated together, and to a base cloth by the application of heat and pressure.

HANDLE FOR POCKET KNIVES.

The blade slides in and out of the handle, the latter having a longitudinal slot to provide for its reception. The handle is provided with a plate spring having a detent which takes into a notch in the inner end of the blade, where it is drawn out.

WINDOW SHUTTER.

The shutter is flexible, and consists of top and bottom rails and intervening slats. The meeting edges of the slats are formed with knuckle joints. The rails and slats are secured to side rails divided transversely and connected by means of flexible metallic strips. This construction renders a whole or a portion of the slats capable of an oscillating movement.

DOOR CHECK.

The door is provided with a rotating button having a rib formed by two recesses, and is pivoted upon a base having a notch in its side. The end-link from a short chain attached to the door jamb is used in connection with this button. The link can only be disengaged from the rib when the recesses of the button are brought opposite the notch.

MAKING ARTIFICIAL STONE.

A compound for artificial stone which has received late protection by patent consists of three and one-half parts of clean sand to one part of Portland cement, mixed thoroughly and combined in a working consistency with a composition consisting on the one part of five gallons of water, and on the other part of one gallon of the mixture made of the following ingredients and in the following proportions, to wit: one gallon of silicate of soda, one pound of carbonate of iron, one and a half pounds of graphite, two pounds of raw umber, and two gallons of rain water at the boiling temperature, and all thoroughly mixed.

FIRE ESCAPE.

Fixed top and bottom guide rails extend the width of the house. The guide frame for the hoist moves to the one side or the other on these fixed guides so as to come opposite any line of vertically arranged windows, by means of ropes working over pulleys. The hoist or safety basket is raised and lowered by a windlass on the pavement, up and down its guide frame. A spring cushion-plate is arranged on the bottom of the frame to break the fall of the basket.

VENTILATING BUILDINGS.

This novel invention utilizes the hollow supporting columns of galleries, etc., for distributing refrigerated air through them to the interior of the room. This is accomplished by making slots in the columns within the room to be cooled. A main pipe and forcing apparatus is employed.

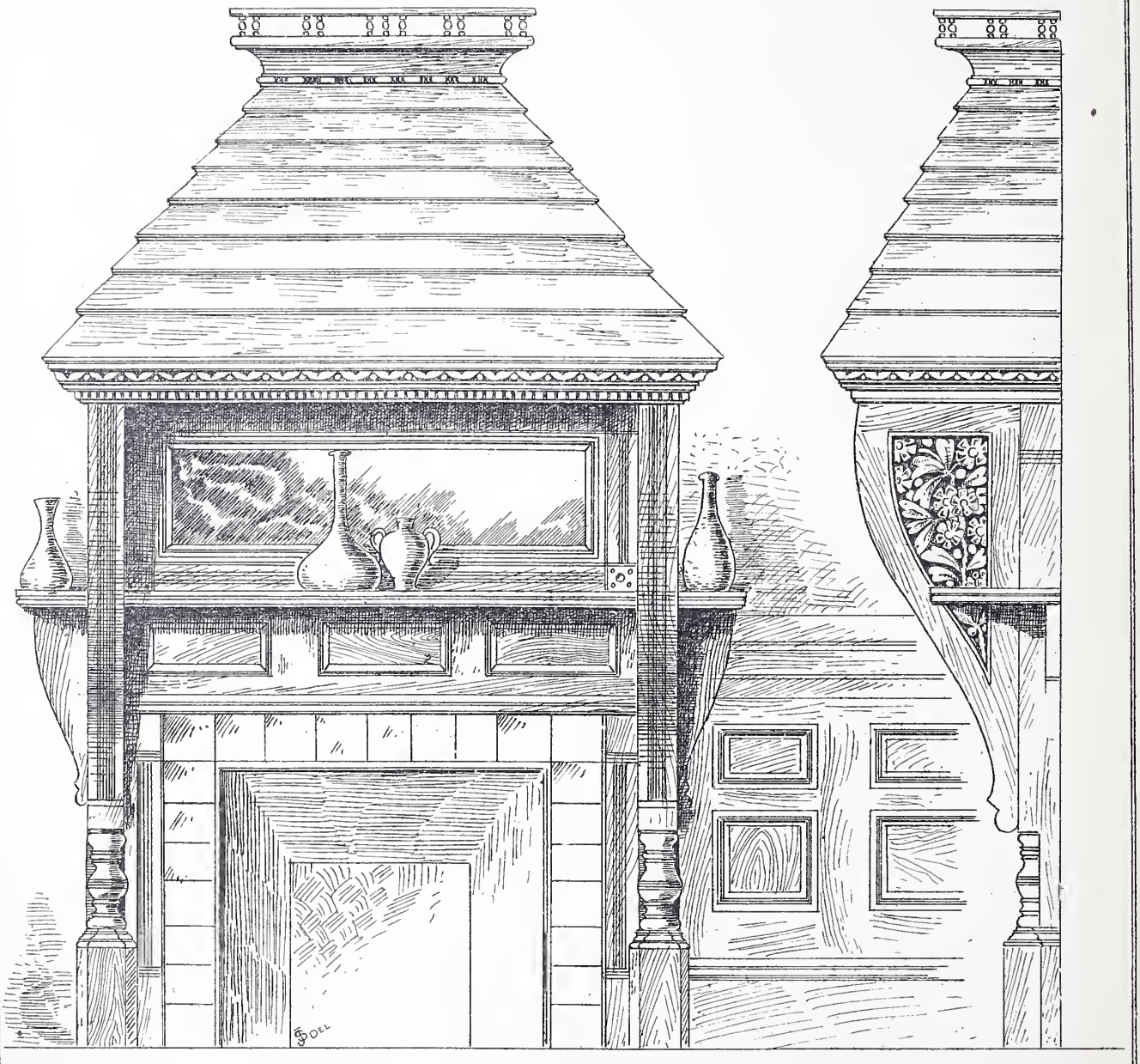
Paper Hangings.

PAPER HANGINGS, or wall papers, as they are commonly called, may be defined as a covering for the interior walls of buildings, made of paper, and usually decorated with figures and designs. They were brought into use as a substitute for hangings of cloth and tapestry.

The art of making paper hangings originated with the Chinese. The time of its introduction into Europe seems to be a matter of some little doubt. It is stated by some that as early as 1555 wall papers were made in both Spain and Holland. Others assert that the English were the first to import and imitate Chinese paper hangings. But the English, being exposed to a high excise duty upon the manufacture, were soon outrivalled by the French, who have brought the art to its high state of perfection, as they are unchecked by taxation.

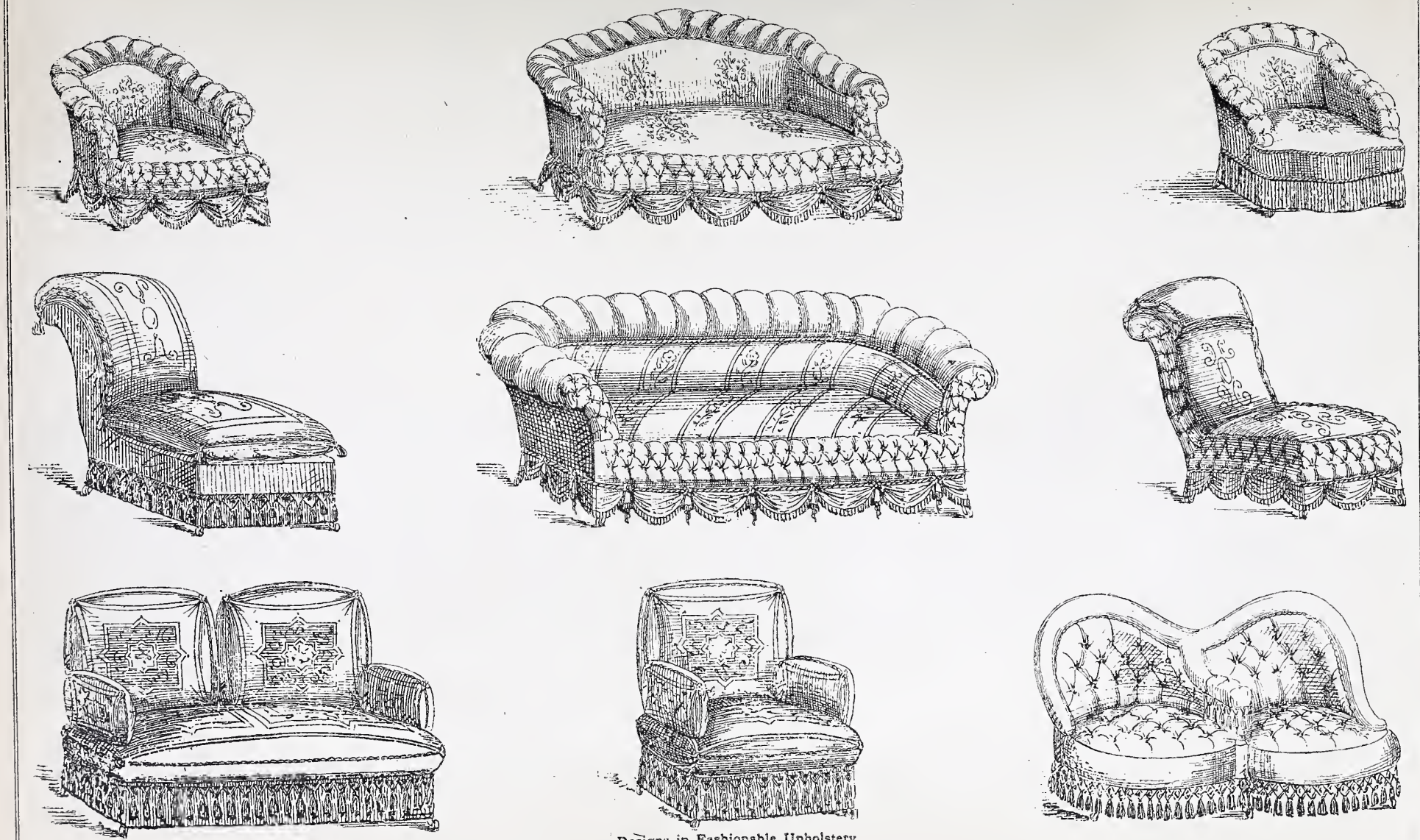
The manufacture of paper hangings, as a leading industry, is of

PLATE Nº 46



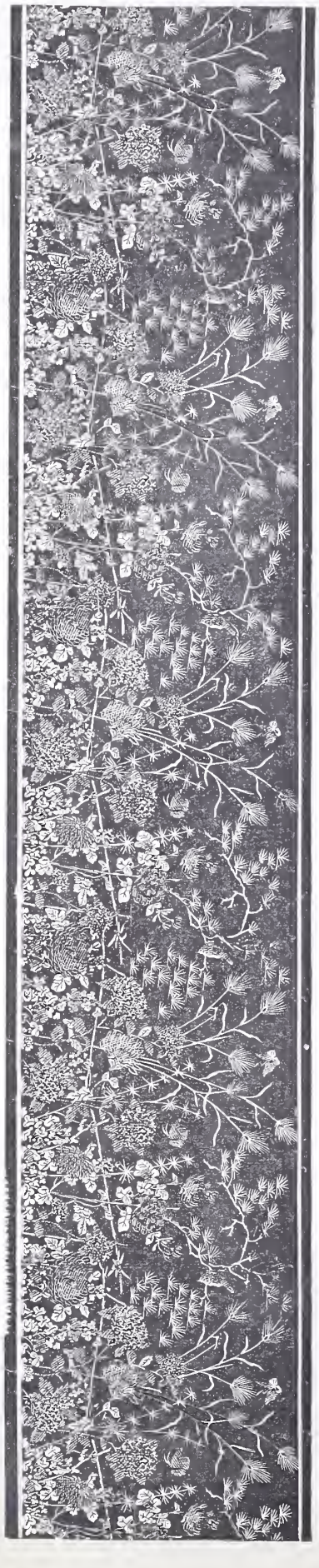
·HALL·MANTEL·

·EDWARD D EWSON·ART DESIGNER·
·28 STATE ST BOSTON



Designs in Fashionable Upholstery.

comparatively recent date. This is due to a great reduction in the cost of manufacture, and the consequent increased demand for the article, owing to the introduction of machinery in printing the different colored designs, thus doing away with block printing to a great extent; and also to the invention of the Fourdinier paper machine, by means of which strips of paper of an indefinite length may be cheaply made. Previous to the invention of the paper machine sheets of paper of the size called "elephant," 22x32 inches, were pasted together to make 12 yard lengths before the pattern was printed.



In the early stages of the art the method used to apply the patterns to the paper was a process of *stencilling*. This was accomplished by laying upon the paper, in an extended state, a piece of pasteboard, having spaces cut out, of various figured designs, and applying the water color with a brush. Another piece of pasteboard, with other patterns cut out, was next applied when the former figures were dry, and a new set of designs were thus imparted to the paper. By a series of such operations a tolerable pattern was executed, but with no little labor and expense—each differently colored portion of the pattern requiring a separate stencil plate.

The processes of calico printing were next resorted to, in which engraved wooden blocks were employed to print the designs. These are still in use. The greatest improvement, however, has been the introduction of machine printing. This has made it possible to manufacture large quantities of the article at a much less expense than by the tedious method of block printing. Machine printing has now reached such a state of perfection that only those skilled in the trade can distinguish machine from hand made paper hangings.

The paper used is unsized, and may be either white or colored. The weight of a single roll, which is eight yards in length for machine printing and nine yards for hand work, is determined in ounces—the paper being known as 16, 20 or 25 ounce paper.

The first operation is the application of the ground to the paper. The pigments used are opaque, and are mixed with size; this is generally clay and a little glue, the clay being used as it absorbs the wet colors which are subsequently printed on.

The grounds are printed on the paper by a single roll machine, in which the paper passes over a large drum, and the color is applied by a revolving brush, the excess of color being taken off with two more brushes, so that a perfectly even coat is obtained. As the paper runs from the machine it is suspended in long loops from sticks, which rest on a slowly moving endless chain arranged near the ceiling, being thus carried the length of a long room, the temperature of which is maintained at a high degree by steam apparatus. By this means the paper is rapidly and thoroughly dried.

If the paper is to be "satined" or glazed, the ground is prepared with gypsum or plaster of Paris, and the surface dusted with finely powdered steatite or French chalk. When this ground is dry it is passed through a series of brushes which revolve with great rapidity, thus giving an evenly polished surface.

A pretty effect is obtained by dusting finely divided mica on the grounds while they are still wet.

For very cheap wall papers no ground is used, but the pattern is printed directly on a colored paper.

The figured patterns are printed on by two methods.

1. *Block Printing.*—This is the slower but more accurate process, and therefore better adapted for fine work. The process is conducted precisely as in the earliest days of paper hangings. The blocks are about two inches thick, and are formed of three separate boards glued together, of which two are poplar, and one (that which is engraved) of pear tree or sycamore. As many blocks are required as there are colors and shades of color in the pattern. Of course, the whole beauty of the work depends upon the nice adjustment of one portion of the pattern to the other, and this is accomplished by guide pins in the corners of the blocks, which are so managed as not to disfigure the surface with their points. In printing, the workman employs the same "swimming tub" apparatus which was used in calico printing. The block is pressed down by a lever worked by the foot.

When a piece has received one set of color impressions, it is taken to the drying room, and dried previous to its receiving the next color. All the colors are applied in the same manner.

A well drawn pattern may produce a very beautiful effect. The history of Psyche and Cupid, by M. Dufour, has been considered a masterpiece of this art, rivalling, it is said, all the productions of the pencil in the gradation, softness and brilliancy of the tints.

2. *Machine Printing.*—Most of the decoration of paper hangings is now done by machinery. The pattern is engraved in parts on a series of copper cylinders, each one of which furnishes a different color or shade of color to the pattern. The cylinders are so arranged below the large central drum, as, by the sum of their revolutions, to make the pattern complete, so that as the web of paper coming over the drum passes the first cylinder, it receives the color for one portion of the pattern and reaches the second in exact time to have the next color applied in the right place. In this way the entire piece only occupies a few seconds in receiving the complete decoration. The paper is dried as in the printing of the grounds.

The better class of paper hangings are embossed when the printing is finished. This is done by passing them through a machine which consists of two finely grooved rollers, one made of pressed paper and the other of steel. This embossing adds greatly to their appearance, as it brings out the pattern far more clearly. *Raised* papers are made by being first printed and then pressed in a suitable machine.

The application of gilding adds greatly to the appearance of the paper and is now used to a great extent. The gilding is made of alloys differing somewhat in composition from bronze gold. Silver and copper are perfectly imitated by varying the composition of these alloys. The pattern is printed on by varnish, and the powder is either dusted on by hand or else the paper is run through a machine consisting of various soft brushes which apply as well as remove the excess of the gilding.

Flock Papers require a special process to give them the well known roughened and velvety appearance.

The *flock*, as it is called, consists of finely divided shreds of waste woolen cloth. This is scoured and dyed. It is then stove-dried and ground to a fine powder; the requisite degree of fineness is secured by successive sifting in a bolting apparatus. Flocks are applied to the paper after it has undergone the usual printing operations.

A mixture called "encaustic," made of linseed oil boiled with litharge and ground up with white lead, is used as an adhesive basis for the velvety powders. The printing is done in the same way as in block printing, the block bearing in relief only the pattern desired to be flocked. If a plain flock paper is to be made, this adhesive material is spread uniformly over the surface.

The paper is then placed in a drum, and the flock sifted over it. This drum is a long rectangular box with a bottom of calf skin. Wooden rods are so arranged underneath this bottom by springs and a connection with an iron shafting running along underneath the drum, that on rotating this iron shafting these rods beat violently up against the under surface of the calf skin. This causes a cloud of flock to rise in the drum and uniformly coat the prepared portion of the paper.

The frieze shown in the engraving is a very handsome one, and is tastefully designed. Messrs. Fr. Beck & Co., corner 29th street

This little work is No. 4 of the WORK MANUALS published by this firm, and is perhaps the most useful for the purposes of the readers of the BUILDER AND WOOD-WORKER, as it gives an excellent description of drawing instruments, their uses and care, along with an immense amount of information on the making of drawings, their coloring, preservation, &c. The information given is of the most reliable kind and is set forth in the plainest of language. We predict for this little manual a lasting popularity as a missionary of sound usefulness. To show the reader what it contains, we print below the table of contents:

Compasses—Qualities, Swiss Instruments, French and German Instruments, English Instruments, Dividers, Compasses with Movable Legs, The Pencil Leg, The Dotting Pen, Bow Compasses, Triangular Compasses, Proportional Compasses, Beam Compasses; Drawing Pens—Single Pens, Double Pens, Various other Pens, The Pricker; Drawing Boards—Materials used in making, Sizes of Boards, Styles of Boards; T-Squares—Materials, Lengths and Widths of Blades, Care, Uses, Straight-Edges and Set-Squares; Sweeps and Variable Curves; Pencils—Qualities, How to Cut, How to Use; Pins or Thumb Tacks; Parallel Ruler; Drawing Paper—Sizes, Qualities, Tracing Paper, Tracing Cloth; Scales—Triangular Boxwood Scale, Diagonal Scale, Flat Scales, Line of Chords, Protractor, Double Scales. The Sector, Plain Scales on the Sector, Sectoral Double Scales, Line of Lines, Remarks; Management of Instruments; Miscellaneous Items—Tracing Paper, Tracing Cloth, Profile Paper, Ruled Squares on Paper, Transfer Paper, India Ink, Prices of Paper, Instruments and Draughtsman's Materials generally.

THE Cornell University Register for 1882 has just been issued, and contains much information of value regarding an institution which is the equal of any in the country. The treasurer of Cornell University, Ithaca, N. Y., furnishes copies on application, so that those of our readers who contemplate making architecture their profession may obtain copies, if they so desire it.

As the course in architecture is a leading feature in this university, it may prove interesting to our readers to know something of the mode of procedure by which a knowledge of the science is imparted, and with this view we reprint the following from the Register:

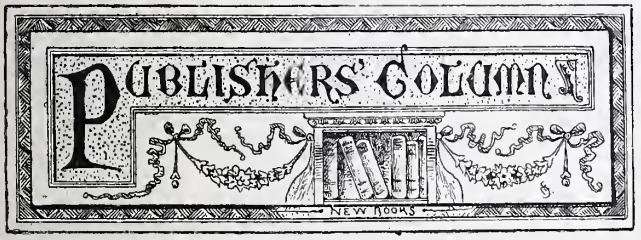
"The course in architecture is so arranged as to give the student instruction in all subjects which he should understand in order to enter upon the practice of the art.

The instruction is given by means of lectures and practical exercises. Its object is not merely to develop the artistic powers of the student, but to lay that foundation of knowledge without which there can be no true art. Drawing is taught during the first two years, and afterwards thoroughly used and applied in mechanics, stereotomy and designing.

Architectural mechanics occupies a part of each term for one year. The lectures are each supplemented by at least two hours of work on problems. In developing the subjects and in solving problems analytical methods are used, but for practical use special attention is paid to the application of graphical statics.

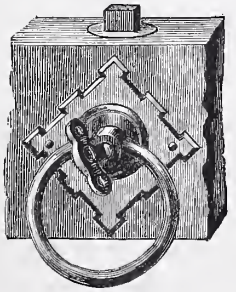
The study of the history of architecture and the development of the various styles runs through five terms. The lectures are illustrated by photographs, engravings, drawings, casts and models.

Proper attention is paid to acoustics, ventilation, heating, decoration, contracts and specifications. The whole ground of education in architecture, practical, scientific, historical, and æsthetic, is covered as completely as is practicable in a four-year course."



☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

THE two cuts shown herewith represent a new form of lock and drawer pull manufactured by the Stoddard Lock Co., 104 Reade street, New York. One of the cuts shown is known as the cylinder lock, and is in a very neat and convenient form for use in various places. No further preparation is required for inserting the lock than three bits, in sizes corresponding with the barrel of the lock, the face-plate and the key-hole piece. The material of which the lock is made is brass, thus avoiding any liability to rust by exposure. The key, as may be seen by the engraving, is of the flat variety, making it very convenient for carrying. Another form of lock of these general features is called the "Patent Recess Lock," of which the barrel is square. In connection with these locks the Company make a patent key-hole and drawer pull combined, affording a very neat finish. The method of applying these locks commends itself by the great saving in labor and cost, no screws or nails being required to fasten them in position. They are particulary adapted for use as a window lock, as they take up very little space. The aim of the manufacturers has been to combine strength and durability with neatness and finish, and we believe they accomplished their object.



No one, having used one of E. Roth & Bros.' hand-saw filers, will ever care again to file a saw without one, as the saving in time and labor is immense, and the result is always certain. We have always taken pleasure in recommending these filers, because we know we are performing a good act by doing so. Send for circulars and particulars to E. Roth & Bro., New Oxford, Pa

WE beg to call the attention of architects, builders, and house-owners, to the new advertisement of N. & G. Taylor Co., of Philadelphia, Pa., in the present issue. This firm is one of the oldest and most reliable in the country, and they take pride in fair and honest dealing, and the "old style" braud roofing tin plate they offer for sale, has no equal for efficiency and durability in the market.

Send for one of their circulars and see what they have to say about their manufactures.

E. R. RENDLE, 7 Warren street, New York, has introduced into this country a system of glazing without putty, that has found great favor in Great Britain and other European countries. The system has not been in use in this country very long, but wherever it has been adopted it has met with great favor, and whenever exhibited at any of our expositions, has invariably carried off full honors. The first premium silver medal was awarded to Mr. Rendle, in Boston, and an award was made to him at the Ninth Industrial Exposition, Cincinnati, and a first premium bronze medal was awarded him in Pittsburgh, Pa., and already many acres of glazing in this country has been executed on this principle, since its introduction. The following, which is clipped from the Buffalo *Express* of July 19, 1881, explains itself:

Visitors to the Central Depot cannot fail of noting the difference in the lighting of the old and new sections, though both have the same width of glazing. Compared with the new section the old appears dark and dingy, and the light is very imperfectly diffused, the heavy sash bars tending toward this end, to say nothing of the wide black streaks apparent wherever the glass has been matched. In the recent addition a new principle of glazing has been adopted, entirely dispensing with the use of putty or cement, and the appearance is vastly improved. The length is 460 feet and the width 30 feet. The invention is, like many others of value and importance, very simple. Copper bars about half an inch wide are used on metal purlins, running in the direction of the slope of the roof; these have curvatures below on each side, which take any water that may find its way into them, completely preventing any drip, the condensed moisture accumulating on one pane of glass passing on to the outside of the one immediately below it. The ingeniously contrived grooves admit of the glass being slipped in, where it is held with sufficient firmness, yet in case of breaking can be replaced by any one without the aid of a glazier. As no perishable substance is exposed to the weather, the cost of keeping such a roof in repair must be considerably lessened, and the elastic bed on which the glass rests prevents many fractures. The system used is known as the Rendle Patent System, and this is the first time it has been employed in any depot or large building in America, though in England it has met with great success and is coming into universal use.

E. VAN NOORDEN, 385 Harrison Ave., Boston, Mass., manufactures a superior kind of galvanized iron cornices, window caps, dormer windows, copper gutters and conductors. Those in want of such things should write him, and forward dimensions and description for estimates of cost, etc.

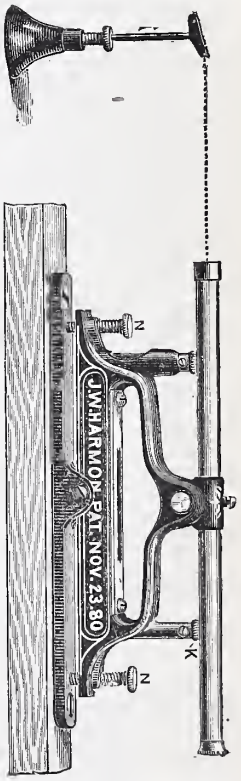
Mr. Van Noorden is well known in New England, and his reputation for promptness and honest workmanship is something to be envied. We are sure that those dealing with him will feel satisfied at the results.

As will be seen by referring to our advertising columns, Messrs. Goodell & Waters of 3103 Chestnut street, Philadelphia, Pa., the celebrated wood-working machinery manufacturers, have added a new branch to their already large list of manufactures, and are now turning out a large number of the Amesbury band-saw filing and setting machines. These machines are becoming very popular on account of their rapidity of operation, correctness of work, ease of adaptation, and perfectness of workmanship and durability.

Owners of band saws should send to the manufacturers for one of their circulars.

MR. J. W. HARMAN, of No. 65 Haverhill street, Boston, Mass., has recently introduced a new instrument into the market that will prove very useful to builders and others who may have leveling and running of lines to do. The instrument is called the "Telescopic Plumb and Level." The accompanying cut shows it screwed to one edge of a straight edge by means of a plate which is attached to it by a screw in the center, and in this position it may be used for taking levels at long range. There is also another device goes with the instrument by which it can be used for running lines at any angle, which renders it very useful for many of the operations performed by engineers and surveyors with more expensive and complicated instruments.

It can also be used as an ordinary plumb and level, and may be relied upon as more nearly accurate than the ordinary wooden-stocked level. The instrument is well made and conveniently arranged, and the price is such that any architect or builder in actual business can afford to buy one.



THE new truss door hangers, made by the Prescott Manufacturing Company, 235 Washington street, Boston, are admirably adapted for barns, stables, warehouses, elevator doors, workshop doors, freight sheds, and other similar positions. These balance and brace hangers are also frequently used on doors in parlors and dining rooms, and as they are concealed from view, perfect in operation, and easy of adaptation, they bid fair to become generally adopted.

E. & F. N. SPON, 44 Murray street, N. Y., the publishers of industrial art books, works on engineering and architecture, and other useful books, are extending their business in this country very largely. Their works are all standard, and are known wherever the English language is spoken. The enlarged volume of business in this country is, no doubt, mainly due to the excellency of the works they publish, and to the energy and wisdom of Mr. Chamberlain, their manager in this country.

CAUTION.—Breinig's Silicate Paint is the only silicate paint in the market. All other so-called paints are only so in name. We are fully aware of the prejudice that practical painters have against prepared cottage colors, and we do not blame them, for all cottage colors are only found in the market in the form of a mixed paint, which contains in some form alkali and water; consequently the painter will receive the censure for using a paint which will not wear. Breinig's Lithogen Silicate Paste Paint is offered to painters in all the various popular shades. They contain all the necessary drying properties, only requiring thinning with either spirits of turpentine or raw linseed oil, according to the character of the work. The various tints and colors will always be found more uniform than can be possibly mixed by hand, and will bear out brighter and are not liable to fade. The wearing properties will surpass the best white lead, being non-poisonous, and in every way superior to mixed paints. We feel assured that practical painters and property owners, on investigation, will approve of the Breinig's Lithogen Silicate Paints. The Bridgeport Wood Finishing Co., Doct. D. E. Breinig, agent, No. 40 Bleecker street, New York.

ADVERTISER'S INDEX.

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THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

PUBLISHED MONTHLY,

AT

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PRICE. ONE DOLLAR AND FIFTY CENTS A YEAR.

CHARLES D. LAKEY, PUBLISHER. FRED. T. HODGSON, EDITOR.

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Subscriptions to Great Britain and the Continent of Europe, Australia and Japan, $2.00; China, Sandwich Islands, Mexico, and Cuba, $3.50; South America, $4,50.

N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, 176 *Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } JULY, 1882. { WHOLE NUMBER, 178 / NEW NUMBER, - 7

AS we are determined to push the BUILDER AND WOOD-WORKER into every nook and corner in these great United States and Canada, during the ensuing summer and fall, and have determined to make extraordinary arrangements with agents who are willing to take hold of the paper and *push* it. For the next sixty days we will give such commissions for new yearly subscribers, that enterprising young fellows will be able to make from 6 to 10 dollars a day with very little effort. We offer a good paper for a very low price, and everybody who is engaged in any of the pursuits, it represents, takes it at sight. And so they may for there is no journal published in the whole world, that gives so much for so small a price as the BUILDER AND WOOD-WORKER is sold for. Write to us for information regarding our terms, and we are sure you will be satisfied.

A FIRM in Quebec, Canada, has recently shipped, in sections, five hundred wooden houses to Panama, where they are to be erected and used by the contractors of the canal. The same firm has also manufactured a large number of houses for shipment to various points along the line of the Canadian Pacific Railway. It seems to us that some of our American manufacturers of ready-made houses are away behind in this matter, for we have had frequent inquiries for just such houses, from the West India Islands, Mexico, and the Central and South American States. We have a fair sprinkling of readers in all these places, and if manufacturers wish to take advantage of this fact, and make money, besides benefiting the denizens of the places named, they will make free use of our advertising pages, which are always open for them. We think it due to American industry that our manufacturers should make some attempt to secure, at least, a part of the "Ready-made House" trade.

MODERN building is often contrasted to its great disadvantage with building in ancient or mediæval days. How much scamped work was done in Rome, or Venice, or Paris, or London, or provincial cities in any country of old, no one knows, because only substantial structures lasted. But no doubt there was more good building in proportion to the whole than now. No doubt either, the poor were lodged in hovels infinitely more uncomfortable than the houses they occupy in the modern world. As for the enduring buildings, they were built for men before whose eyes things were shifting rapidly. A merchant could not safely reckon that his great grandchildren or men of their generation would carry on his business in his shop ; it was wise, therefore, to make its walls thick, to finish its wood-work well, and to ornament it in an appropriate manner. So it was throughout Europe ; men built well because it would have been wasteful to build badly. Men build badly now because on the whole it would be wasteful to build well. The supply of structures is equal in stability and beauty to the demand.

But because it is inevitable that makeshift structures should be run up when population grows rapidly, it does not follow that buildings should not be sufficiently looked after to secure the public safety and health.

IT is an acknowledged fact among sensible people, that it is the duty of every man to provide for his family while he is in health and strength, and to make some provision for them so that they may not suffer for want after his death. There are some men who have foresight enough to make such investments while living, that, in the event of their deaths their families will be placed beyond the approach of want. This can only be done however, by men who have ample means while living and under these conditions the making of these provisions would almost seem a work of supererogation, for a man that is wealthy enough to make investments while living, of such magnitude as to be sufficient to provide for his family after his death, will, in ninety-nine cases out of a hundred, leave sufficient means behind him to maintain his family and provide for their future. To the man of moderate means, provision for his family by large investments, is simply out of the question, and here it is that Life Insurance in its various forms steps in to solve the question of "How can I provide for my family after I am dead ?"

Certainly, there are no better means than through the agency of some of our healthy Life Insurance companies, to secure for those dependent on us while living, a substantial competency after death.

WHILE, as above stated, there can be no place where a man of moderate means can so wisely place his money for the benefit of his family, as in the hands of some solvent Life Insurance Co. But while it is the duty of every man who possesses means enough, to insure his life in some of the larger corporations, it must not be forgotten that there is a large class of men that cannot possibly afford to pay large yearly premiums and in conse-

quence are excluded from the benefits of insurance. The co-operative system of insurance opens a way for this class, and we know of no better company than the "Builders and Manufactuers' Mutual Benefit Association of America." The rules and regulations of this association seem to be based on fair and equitable principles, and the terms are such that any business man or mechanic can afford to comply with. The expenses are very low, and are met by admission fees and annual dues, the former being five dollars, and the latter two. Two dollars are paid upon the death of a member, and as the number of members is limited to five hundred, the maximum benefit in the first class amounts to $1000. There are two other classes in which a member may run up a benefit of $6000. With an increase of benefit, as a matter of course, the expenses are increased, but even the greatest maximum benefit would not tax the pockets of a well to do mechanic beyond his ability to meet it easily. The offices of this company are at 194 Broadway, N. Y.

THE conflict between labor and capital goes on apace, and the same old battles are fought over and over again. Arrogant and stubborn capital on the one hand, refuses to treat labor as its equal or give its demands that consideration which is its due, and labor on the other hand dissatisfied, morose and often ill-advised, defiantly folds its arms and suffers unaccountable hardships in its frequent fights against the wrongs done it. When will these eternal conflicts end? Is labor always to be subject to disturbance and abuse because a few within its pale may be restive and ill-advised, and because capital chooses to recognize in it only a means to self-advancement and luxury? Can any one tell why "Cash" should receive more respect than the originator of Cash? Let a body of workmen demand an advance, be it ever so trifling, and a "Hue and Cry" is at once raised against workmen generally, and that body of workmen in particular. The press, the pulpit and—we were going to say the rostrum, but politicians dare not say on the rostrum what they put in practice in legislative halls—but let a man or a corporation make an advance in price on materials, products, or transmission of goods, and it is considered simply as a business transaction. The public pays the advance and thinks no more about it. This is strikingly illustrative in the building trades; if the masons, plasterers or carpenters ask for a slight advance, they are looked upon as rebels and unreasonable monsters, and they are threatened with a stoppage of work and a thousand and one other terrors, if they do not abide by the old rates, and the press and pulpit denounce them as disturbers of the peace and trade; the advance asked may only be a trifle, but the smallness of the amount does not lessen the sin in the eyes of most people. Material may go up sky high, hardware may advance, cost of professional serviees may increase, but little is heard of all this in the outer world; this is simply a matter of business or rather it is capital demanding and obtaining what may, or may not be, its right. It makes all the difference in the world "whose ox is gored."

THE demand for parquetry floors is continually on the increase. They take the place of carpets for covering the coarse boards of ordinary flooring, and are made by ingeniously mortising together different kinds of wood. Most of this flooring is made seven-eighths of an inch thick, and what is known as "wood carpet" is made only about one-fourth of an inch in thickness. The principal body of parquetry work is oak, in different shades, but every kind of cabinet wood is used—mahogany, tulip, walnut, cherry—all furnishing a variety of shade, which, when properly set, harmonize with agreeable effect. The entire mosaic, when mortised, and joined, can be lifted without breaking or injury. Nothing neater and more refined can be found for a floor covering to a room than a center rug or carpet, either in the shape of a square or parallelogram, and surrounded on all sides by a neat pattern in wood. If one wishes to practiee closer economy he can cover the space occupied by the carpet, the piano, stages or other pieces, with plain wood the thickness of the parquetry wood. The surface polish of the wood must be maintained to retain the beauty and finish of the floor. Waxing is often sufficient, or a vigorous application of shellac varnish. The origin of this style of flooring can be traced back to the early history of Western Asia. The material used was usually marble. From these early days to the present, changes have taken place. Wood has succeeded stone, and the jig-saw the chisel. For some time past, parquet work has been successfully used in Germany, France, and lately in England; and in this country, although new at present, we predict for it great popularity. In our American homes parquet flooring is particularly adapted for backgrounds, rugs or square carpets.

PLATE 49 shows the front elevation of the Vasser Brothers Institute, Poughkeepsie, N. Y. We are indebted to J. A. Wood, of 240 Broadway, New York city, architect, for the drawing.

Plate 50 shows perspective sketches of a country cottage prepared for our pages by R. A. Cram, architect, Boston. The plate shows a portion exterior of cottage and a perspective view; also, a perspective view of part of the interior of hall.

Plate 51 shows front and side elevations of cottage shown in preceding plate. The first and second floor plans are also shown in this plate.

Plate 52 shows details, sections and plans of interior finish for same cottage. Two mantels, two doors, newels, stairs, and their sections and details are shown.

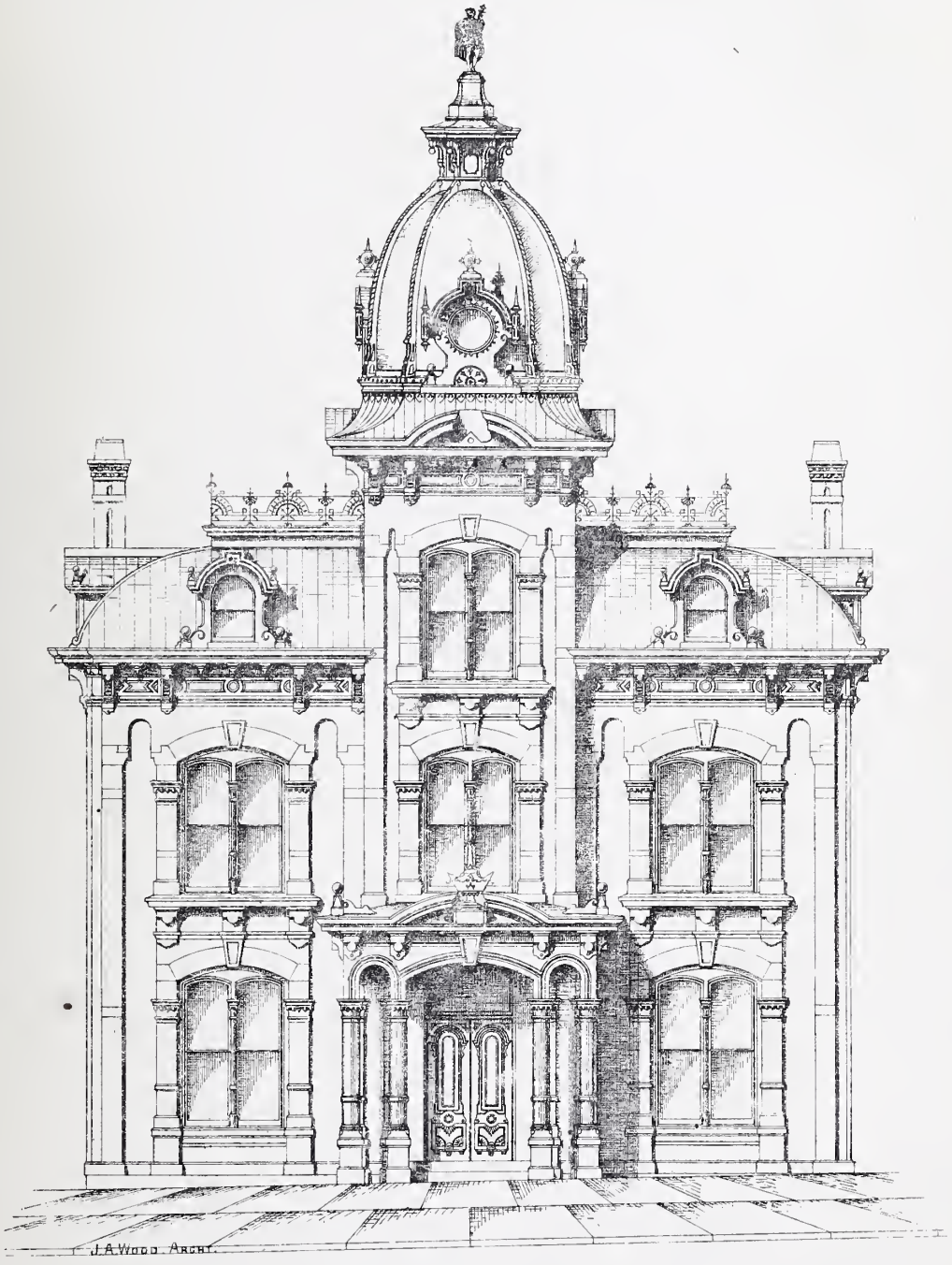
Plate 53 is a continuation of details and shows windows, doors, ornaments, finish, &c., &c.

Plate 54 shows a number of details, drawn to scale, of a veranda, dormer windows, bay windows and cornice. This will prove a useful sheet to many of our readers. We are indebted to Mr. S. M. Howard, architect, Wheeling, W. Va., for this sheet of drawings.

Plate 55 shows designs for four mantels. This plate is reproduced from plate 5, of the "Study Book," published by J. O'Kane, of this city, and of which a notice is given in this issue.

Plate 56 on the upper half shows some furniture in the Moresque style. It will be noticed that the Saracenic arch, scrollwork, cusping, &c., are all brought into requisition, whilst the turning is treated in a sufficiently Moresque manner. The frames are finely carved and ebonized, and in themselves would be interesting, but the appropriate covering applied, gives to the suite an additional and speeial interest. The deeorated centers are framed up with a margin of peacock blue, and a bordering of dull maroon makes the coloring eomplete. These tones come out well against the dull ebonized frames, and a finish with brass nails gives the suite a novel and Oriental effect. With the cove painted in Alhambra style, the curtains embroidered to match upholstery, and the article enriched with speeimens of Moorish art, it would certainly look original and pretty.

PLATE No. 49



VASSAR BROTHERS INSTITUTE.
POUGHKEEPSIE, N.Y.

The lower half of the plate is almost self-explanatory, but for the sake of making the idea perfectly clear, we may recapitulate the leading features of the suite. It consists of wardrobe, chest of drawers, and toilet table combined in one piece. On the left is a hanging cupboard of sufficient height for coats, and on the right are two long and two short drawers, the latter being for shirts, underclothing, &c. To the right of these are two recesses for boots and slippers, whilst above is a cupboard for soiled linen. The top, of course, forms the dressing-table, to which is attached, on the right, three small drawers for collars and cuffs, handkerchiefs, scarfs, gloves, &c., and above a recess for books. The top finishes with a ledge or gallery round back and sides to receive a time-piece or any other suitable article. On the hanging cupboard to the left are four small pigeon-holes, for hat, coat, or hairbrushes, &c., also a recess for holding toilet requisites. At the back of this is a small cupboard, fitted with sliding panel, intended for the reception of medicine or other bottles. It is furnished on top with a gallery to match other side. In the center is the glass, supported in the usual manner, whilst at each end is a most convenient double hat and coat hook. The whole article only measures 4 ft. 6 in. wide by 5 ft. 8 in. extreme height.

The washstand is combined with towel-rails on either side and two chamber cupboards below. It is fitted with large plug basin, sunk flush into the marble top, and also has a large ewer and receiver beneath. The double-tile back for protecting walls, and a bottle bracket in each corner, give the back a substantial and ornamental appearance. This washstand does not, of course, claim so much notice as a novelty. It is, however, a most suitable companion to the wardroom dressing-table, and measures out to out 4 ft. 1 in. by 2 ft. 2 in.

Instead of the ordinary cane chair, two croquet chairs with long carpet backs, carpet seats, and arm-pads, are supplied, made up in same wood as the suite.

The Vassar Brothers' Institute.

THE Vassar Brothers' Institute, at Poughkeepsie, N. Y., the front elevation of which we show in Plate 49, is now being built by Mr. John Guy Vassar, in memory of his brother, Matthew Vassar, Jr., who died a year ago, leaving large sums of money to Vassar College, the home for unfortunate business men, to found and maintain a hospital, and numerous other charities.

The Institute, when complete, will be presented by Mr. Vassar to the organization bearing the title as above, and dedicated to Science, Literature and Art.

The building is 52 ft. front by 100 deep, is built of fine brick with granite dressings, with all modern improvements, in the most substantial manner.

It will contain apartments for a library, laboratory, meeting room, aud for a lecture room on the first floor, with a balcony capable of seating 575 people. This lecture room has circular seats rising one above the other, with parquette and circle as in our best theaters. The stage is spacious, with dressing rooms and green room, and scenery, lights, traps, &c., for dramatic representations.

In the second story will be the museum, handsomely fitted. In the third or attic story will be the studio.

We have departed from our usual custom in giving this building to our readers, as it seems to us that just such buildings are needed and adapted to the wants of most of our growing towns and villages; and we hope there are plenty of liberal gentlemen who, now that they have a precedent, will follow Mr. Vassar's example.

The design is by Mr. J. A Wood, architect, of 240 Broadway, who completed Vassar College, built the Riding School aud Museum, and the Home for Aged Men, all gifts of the Vassars.

Planing Machines.

BY J. T. L.

WHILE the uses to which a Daniel's and Gray & Wood's mills are very similar, and to a great extent identical, yet there is a difference which will bear comparison. The Gray & Wood's planes out of wind to a certain extent, but not perfectly, while the Daniel's mill does its work to perfection without any trouble. The reason is that to a certain extent we must use a pressure on one, while on the other there is no such necessity, and the stuff lays easy and natural on the bed, and just a slight dogging holds it firm enough, even if the piece to be planed is very small. It would hardly be possible to glue up stuff from the Gray & Wood's, and have the gluing hold good, but from the Daniel's it is hardly possible to make a better glue-joint than the mill leaves it if it is handled right. But when the work, or style of work, is changed from cabinet and pattern makers, and such like work, to timber and the large part of car work, the Daniels loses to a certain extent its particular value. While it will do the same work, and do it well, it will not produce the quantity of work which a Gray & Wood's will. In a shop or mill where there is work enough I would put in both kinds. For general planing-mill work, where the largest part of the work would be heavy plank and timber, I would use the Gray & Wood's, but where the work is mixed, and a considerable part of it is door, sash and blind work, I would use by all means the Daniel's mill.

I believe I have made all the comparisons between the two machines that is necessary, and to those putting in machines I would say: consider what kind of work you are going to do the largest amount of, and govern yourselves accordingly.

The greatest fault I shall find with the Gray & Wood's mill of some manufacturers, is their light build, which in some cases is perfectly ridiculous.

Only think of a gigging and feed motion hung up where the most strain comes by four $\frac{1}{2}$ in. wood screws into a soft pine frame? Perhaps you have got a 40 or 50 foot bed, and it is all the same. You cannot run it but a very little while, before you can turn your wood screws out with your fingers and your gigging motion is what sailors call "playing Isaac and Josh," and all this part of your mill is at loose ends. I find the best way to fix this part is to drill through the frame and iron standards, and after putting a good thick piece of belt leather under the frame, bolt solid with $\frac{5}{8}$ or $\frac{3}{4}$ bolts; then you are in shape to go ahead, and your gigging frame will be firm and in its place all the time. Another thing, the racks of most mills are just screwed on with little short $1\frac{1}{4}$-in. No. 12 screws. No mill should ever come from the manufactory without having the rack fastened on by a $\frac{5}{8}$-tire bolt, and at the end a T piece of iron fastened on to each end of the rack by a long joint bolt. This keeps the sections of the rack close together, and the strain comes on the joint-bolts instead of the little bolts that go through the rack.

I must say, however, that this condition of things does not apply to all of this kind of machines made. When the friction feed was applied to this kiud of mill, it relieved the gigging motion of that quick jerking motion which necessarily existed when the old cam feed was used.

One great fault exists in the buyer of machinery, who will generally go on a prospecting tour through the catalogue and price lists of makers, and in a great many, if not the majority of cases, select the lowest priced machines in the market, and when the machines come to the rough and tumble of hard rough work, they are not what is wanted, and it costs more in the end to patch them up and keep in repair than to buy a first-class mill at the start.

I will give just one instance of that kind as an example of the many cases existing. A large concern wanted a heavy mill to plane almost exclusively heavy timber anywhere from 6x6.8 ft. long to 16x16.60 ft. long, and instead of buying just what they wanted, they finally took a little 16 ft. sash mill aud lengthened it out, and as a result they have already spent enough in repairs to pay for a decent mill ; and after all this expense have got nothing but a rattletrap to do what they want a really first-class mill to do. My idea about all such things is to get something that will do a little more than you want it to do just now, for there are times when somebody wants extra things done. Always have a good reserve on hand in case of au emergency. I wish I could impress this idea on the minds of every manufacturer and user of machines and motive power in the country. The same rule applies to setting down a Gray & Wood's style of mill, as to the Daniels. A good solid foundation directly under the machine part, and the whole length of the bed frame, well set down on something firm and unyielding, so that it will neither get out of line or settle in places. A great deal depends on this part for the mill to do good work and do it easy.

I think the Stover mill the best made mill in the country, and should buy that make in preference to any other mill made for the reason that every part is well proportioned; not one part light and weak and another heavy and cumbersome. In doing the same kinds of work, such as tapering and beveling, there has to be a little different arraugement for holdiug the work in the two mills, but a little ingenuity will easily devise ways to hold any such kind of work as is common to both, as the conveniences for dogging are similar for both mills. In jointing up small work, and such work as door rails and stiles, I nearly always use the common hand clamp, as work of that kind can generally be squared up truer than any other way.

The Gray & Wood's mill ought to have iron angles come with it to hold stuff for jointing, but for beveling you will have to get up

your own angles to suit the bevels which you most commonly use. Wooden blocks or angles will answer very well if you only have small quantities of such work, but when there is work like some kinds of car work, which has to be repeated at short intervals, I should by all means have iron angles. I have often used the Gray & Wood's mill to get out plain molding, where only one side was to be stuck, and it can be used to great advantage for getting large thresholds by planing the plank one side and joining, and then have a set of knives ground just to the shape you want, and you can cut them just to your liking. Altogether I think the Gray & Wood style of mill one of the best machines that can be put into a shop or mill, especially so in a carpenter shop in a small place, where it is inconvenient to get to the regular planing mill. But whenever you have one, have a good one, and a little larger than you think you may want, for there are always times when extra things are called for in all departments of work, and it is wise to be provided for such contingencies.

Specifications of Cottages.

(Shown on Plates 50, 51, 52 and 53.)

SPECIFICATION OF MATERIALS TO BE PROVIDED AND LABOR TO BE PERFORMED IN BUILDING AND COMPLETING A DWELLING HOUSE FOR ——— ———.

Said dwelling to be according to plans and specifications furnished by Ralph A. Cram, architect. All materials and labor must be to the satisfaction of said architect in every respect.

The contractor must give his personal supcrintendence and attention to the work, and must furnish all needed apparatus and transportation.

All materials, except when otherwise specified, to be the best of their kind, and all work must be performed in a thorough and workmanlike manner.

Excavation.—Remove the loam from the site and stack the same within one hundred feet of the site; also, remove all the loam from all around the house for a distance of five feet from the sill in all directions, and stack the same with the other loam for future grading.

Excavate to the full depth of the cellar 7 ft. 6 in. clear height from level of cellar bottom to underside of floor timbers. Leave the cellar bottom hard and smooth throughout.

Excavate trenches for footings of cellar walls 6 inches below general level of cellar bottom; also for piers as may be directed.

All dirt excavated must be removed entirely from the premises if so directed when excavation is made.

Foundations.—Lay up in best manner a firm solid dry wall, where and as shown and called for, of good, sound, selected rubble stone, thoroughly bonded and made secure throughout, with good even plumb face inside and good regular batters outside, thoroughly and neatly pinned up inside and outside with good angular stone chips. All walls must be bedded to good hard bottom of native and undisturbed earth, and, if bottom is not reached at depth shown on drawings, the contractor is to go to solid bottom and build up therefrom without extra charge. Point up neatly inside with cement mortar.

Build roadway walls in like manner.

Underpinning.—Select good, handsome, even, good-colored stone for the underpinning to make neat even work, and set the same compactly and pointing up handsomely in cement mortar. Make bevels at cellar windows and cover the same neatly with cement mortar, making even slope and neat work out and in.

Bulkhead.—Build where shown the bulkhead walls giving them an even slope at the top. Finish and set suitable foundations for outside steps, veranda, and cellar piers and chimneys.

Brickwork.—Build all the brickwork indicated of best selected hard whole brick of approved quality, laid up in best manner with strong lime mortar until the topping out of chimney is ready, when the bricks are to be carefully selected, with reference to even color, and are to be laid in cement mortar colored as may be directed. The cement to stand one foot below the roof boarding, and all exposed upper surfaces of brickwork to be covered smoothly with cement.

Turn trimmer arches, four inches thick, for support for all hearths, and level up solid with bats and mortar to receive hearths. The flues throughout are to be carefully and smoothly plastered inside, from bottom to top, and each stack is to be carefully plastered outside, from first floor to roof boarding. Build ash pits under each first-floor fireplace, and fit the same with good strong cast-iron doors, in iron frames set in flush, six inches above floor.

Ash Grates.—Furnish and set in each first-floor fireplace, a strong iron grating communicating directly with ash pits below. Set this grate 1¼ inches below level of hearth, and furnish and set looscly upon it a slab of terra cotta, smooth on top, and of sufficient thickness to bring it level with top of hearth.

Rings and Thimbles.—Furnish and set where shown, rings and thimbles of galvanized iron, 6 inches in diameter.

Lath and Plaster.—All the walls, partitions and ceilings throughout the house, including such parts of the attic as be directed, also all chimney breasts and all other furred portions as may be prepared for the same, are to be lathed with good, sound, spruce lath, as well seasoned as the market affords, set with ⅜-inch opening, breaking joints every six laths, firmly nailed to every bearing. Cover the lathing in best manner with best of two-coat plastering. Plaster outside walls to the under floors. The first coat to be a strong coat of lime and hair. Lime to be best Thomaston lime, hair fresh and strong, sand clean and sharp. Mortar bed to be made up five days before using. Mortar to be laid on in best manner and forced well through to a good clinch, and floated down to a good true surface. Second coat to be a heavy skimming of lime and sand putty put on after the first coat is hard and dry. All surfaces to be brought to a true and even plane, carried up to grounds everywhere with angles sharp and true. Plasterer to clean up his own dirt and do all mending and patching, and leave all walls and ceilings clean and white and ready for paint or paper.

Frame.—Finish, set and secure in best manner the frame, as shown by framing plan. All framing lumber not otherwise specified, to be of first quality sound spruce, as well seasoned as can be obtained. Mortises tennoned and pinned with oak pins, and every part secured in best manner and thoroughly tied through in all directions.

Floor joists are to be crowned one-half inch when the span is more than eight feet and all joists to be set crowning side up, and firmly secured.

Bridging.—Floors to be bridged in best manner with plank; bridging doubled-nailed at each end throughout with tenpennies. Rafters to be firmly set and tied together and supported in best manner. Headers to be framed through trimmers and pinned. Inside partitions to be two by four and two by three, set for four nailings to the lath. Doubled at all openings. Truss over all openings of more than three feet, and double the headers over all openings. Veranda to be firmly attached to the main sill, and firmly supported everywhere; set to pitch one inch away from house.

Wall and Roof Boarding.—Cover the walls of the outside frame in best manner with good, sound, square-edged spruce boarding, set snug and firmly, nailed with tenpennies to every bearing. Neatly jointed, always on a stud or post, and thoroughly covering each part. Stock must be free from large or loose knots and mill planed on one side. Roof boarding to be of second quality matched pine boarding thoroughly seasoned, well driven together, and firmly nailed to every bearing. Boards to be sound and free from large or loose knots, and mill planed.

Fur the ceilings in best manner with strap furring set true and level. Fur the chimney breasts with 2x4 stock firmly set with openings as directed for fireplaces. Furr for finish under roof and elsewhere.

Grounds.—Furnish and set true and even ⅞-in. grounds for all finish around all doors and windows, also for all openings, also for all wainscoting and baseboards. Set grounds to carry plaster to under floor on all outside walls.

Paper.—Cover the wall and roof boarding throughout with best of heavy sheathing paper laid in best manner, lapping edges and firmly secured. Over this put broad strips of heavy tarred paper around all outside windows and door openings and at the angles of upright walls extending past the corner boards, and for 3 inches at least under adjacent clapboards or shingles.

Shingles.—Shingle the roof throughout with good sound seasoned first quality sawed cedar shingles, laid in best manner, showing 4½ inches to the weather.

Shingle the seeond story and first story from underpinning to bottom of windows with good sound well seasoned selected sawed cedar shingles.

Flashing.—Flash thoroughly around all chimneys and dormers and where valleys occur. All flashing must be of broad heavy zinc, properly secured with galvanized tacks, 1 inch long, and the whole house must be warranted tight in every part.

Clapboards.—The outside walls are to be covered where shown with first quality planed pine clapboards laid and fitted in best manner in horizontal courses, neatly butted to each other and to finish laid 3½ inches to the weather.

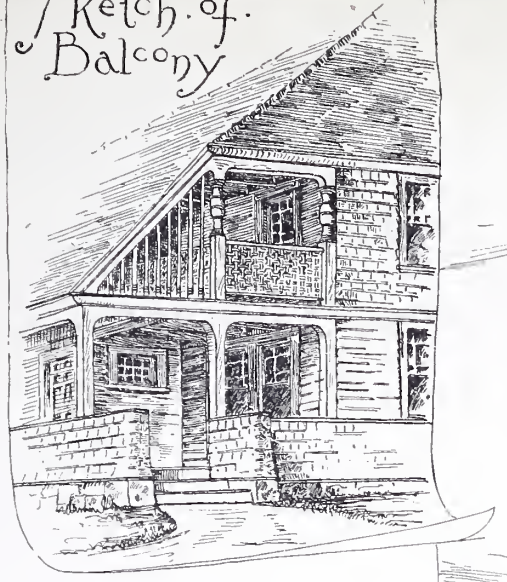
Outside Finish.—All outside finishing stock must be of first quality, thoroughly seasoned white pine of dimensions and form shown by detail drawings, put together in best manner.

Gutters and Conductors.—Provide and set in best manner, molded gutters and round conductors 2½ inches diameter inside gutters, put together with white lead, and so set as to drain quickly and completely to the conductors which are to be connected with the same by 2½-inch heavy lead goose necks. Hang the conductors to place in best manner, firm and strong.

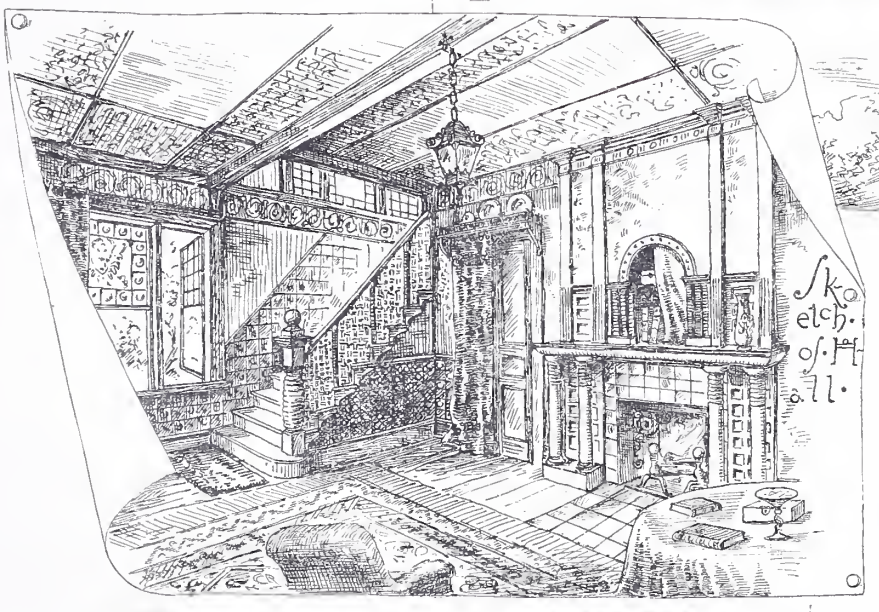
Veranda —Build the veranda floor of first quality hard pine, not over two inches wide, laid tight, and firmly nailed to every bearing. Moulded nosings at the edges, with steps floored in like manner, with risers of a single piece of hard pine. Floors laid to pitch one inch from point of house.

Doors and windows.—Door frames throughout to be of two-inch beaded and planed pine plank, put together in best manner and

Sketch of Balcony



Perspective Sketch.



Sketch of Hall.

A Country Cottage.

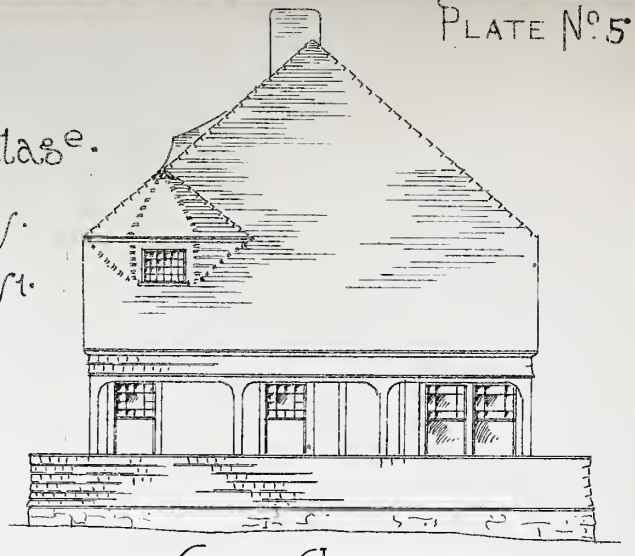
Designed by
RALPH A. CRAM.

LXXXV Devonshire St.
Boston, Mass.

Design for a Small Country Cottage.

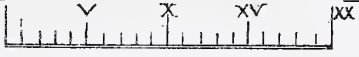
Ralph A. Cram. des.
LXXXV. Devonshire St.
Boston. Mass.

Side Elevation.

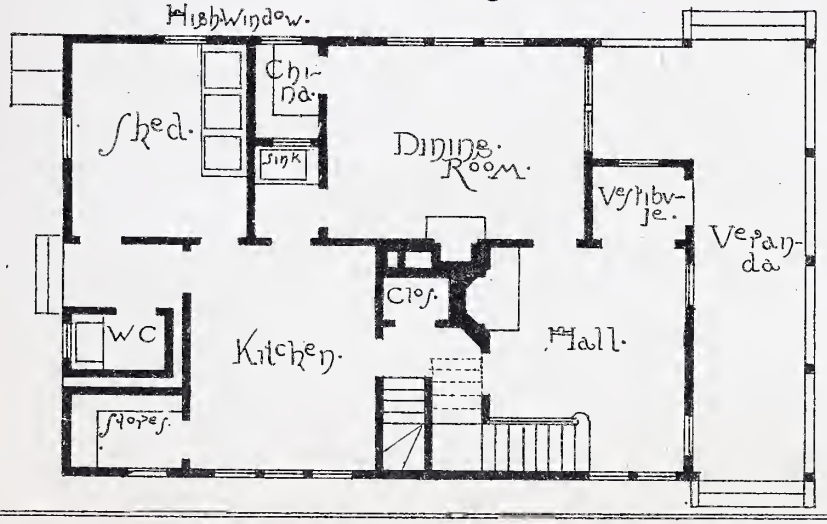


Front Elevation.

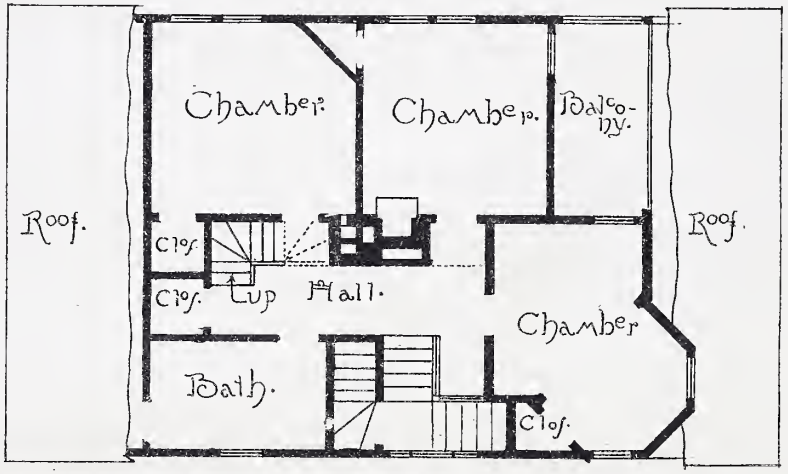
Scale.



Plan of First Floor.



Plan of Second Floor.



firmly set true and plumb throughout. Form the rebate by planting on and properly securing to the same a half inch piece of such size as to allow the door to be hung on either side. The doors throughout to be first quality, four paneled, mill made, flush moulded pine doors, one and three-quarters inch thick. Closet doors one and one-half inches thick, not molded on inside. Outside doors to be two inches thick. Rear doors four panneled. Front door as per detail.

Hardware.—The doors throughout to be provided with approved, brass-faced, mortise locks costing $12.50 per dozen, for inside doors ; $3.50 for the outside front door ; and $2.00 each for the other two outside doors. All cupboard doors to be provided with suitable hinges and catches.

Butts.—All doors to be hung with strong, suitable, japanned slip butts, acorn tipped, on first story main room, plain elsewhere.

Window Fasteners.—Provide and set in best manner to all double hung windows the "Morris" meeting rail sash fastener of bronzed iron.

Window Frames.—Window frames of all double hung windows throughout to be first-class open box frames of white pine, with hard pine pulley stiles and leads. All sashes to be one and three-quarter inch rebates, and molded pine first class and put together in best manner.

Upper Floors of dining-room, hall, and kitchen to be of selected narrow strips (not over three inches wide), of matched heartrift hard pine, laid in best manner, driven hard together and blind nailed, carefully butted, breaking joints everywhere, neatly fitted up to baseboards and finish, and smoothed up in best manner.

Upper floors throughout the house, except where otherwise specified, to be of selected clear spruce floor boards, square edged, not over five inches wide, driven well together and firmly nailed, with two nails to every bearing, breaking joints everywhere and carefully smoothed up.

The floor of the attic is to be extended to the plate everywhere and firmly nailed to every bearing. Floor to be of single thickness of seven-eighth inch matched first quality floor boards.

Inside finish.—Finish throughout, including upper floors, to be of best of thoroughly kiln dried stock. Door and window finish throughout to be of one inch stock, five and one-half inches wide, molded and beaded as shown. Finish of first quality white pine, except where otherwise called for. Baseboards throughout the house molded everywhere except in closets, to run to under floors to be ten inches high over all. Kitchen to be sheathed up three feet six inches high, with first quality narrow triple beaded sheathing, and capped with beaded strip seventh eighth inch by four inches.

Kitchen Sink.—Furnish and set where shown a wooden sink, outside measure, made in best manner, with white lead. Set cupboard under sink, having broad doors to open out the entire width of the cupboard, with such hard-wood pegs as may be directed.

China Closet to be finished with three drawers, made to work easily ; one cupboard, with glass door and proper hinges and fastenings ; shelves throughout where directed.

Store Room.—Fit the store room with cupboard as directed, with three drawers below it ; shelves on one side and broad molding board at end ; cleats and strong meat hooks as directed.

Coal Closet to have cleats with two rows of strong double hooks and one shelf.

Linen Closet to have three drawers in bottom, extending from back to front of closet, with shelves over them as directed. All other closets to have strips and hooks as may be directed.

Bath Room to have the plumbing cased in matched and beaded pine sheathing, with molded nosings. The casing of water closet and cupboard under bowl to be so arranged as to be removed easily and at once by turning a button. The water closet seat, as well as the cover, to be made to lift, and both to be neatly fitted and hung with strong brass hinges and screw strips, and handsome bronzed iron hooks where directed.

Water Tank.—Build a strong water tank 3 x 2 x 2 ft. where directed in attic, of seasoned pine grooved, and fastened in best manner, and put together with white lead. Furnish a light, firm, and neat cover for this tank, neatly fitted, to keep out dust and give easy access to tank.

Stairs.—Build on good strong plank stringers the stairs where and as shown. The principal flight to be throughout of white pine, wrought as per detail drawing, put together in best manner and left in best shape for painters' finish. The remaining flights to be simple and strong, with plank stringers, spruce risers and treads, molded nosings. Newell post ballusters, &c., as per detail drawing.

Painting.—All material used in painting must be of the very best of the kind in the market. All outside finish must be primed as soon as set with a strong coat of raw linseed oil and lead ; carefully putty stop and prepare for second coat. The complete outside painting to be the best of two-coat work of such colors as may be directed. This includes all exposed woodwork. Shellac all knots or doubtful places before painting. All inside pine finish to be prepared, putty stopped, and painted two strong coats of best lead and oil of such colors as may be directed. This does not include floors in hall, dining-room or kitchen. Give all hardwood floors one strong coat of "Wheeler's Preservative," costing $2.50 per gallon. The standing finish of kitchen, pantry, china closet, and all closets, including all shelving, to be thoroughly shellacked and varnished with best materials. Veranda floors and treads and risers of outside steps are not to be painted. Sashes, after being glazed, to be painted two coats outside, as directed, and stained and varnished as directed, and stained and varnished inside. The same for stop beads of hard pine. The hard pine pulley stiles and parting beads to be thoroughly oiled with oil applied with a brush. To every five gallons of paint for outside work add one gallon of "Wheeler's Preservative."

Glazing.—The glazing throughout to be of selected double-thick German glass, without flaw or blemish. All glass to be set in best and most secure manner, pinned in and neatly puttied throughout.

Miscellaneous.—The contractor is to do all cutting and jobbing and finishing up after other mechanics. The contractor is to do everything to complete the house ready for occupancy, according to the true intent and meaning of these specifications and the plans to which they refer, whether each item is covered by this specification or not.

This is the specification referred to in our contract, dated

SPECIFICATIONS OF PLUMBING TO BE DONE IN HOUSE, FOR—— ——

Plumbing, First Floor.—To have one 40-gallon copper tank boiler, set on iron stand, furnished complete with sediment cocks and connections of brass, for hot and cold supply to range ; connection in best manner.

Tubs.—One set of three tubs, soapstone trays with 6-inch backs, furnished with hot and cold supply to each tray ; brass faucets, plugs, chains, wastes, &c., complete.

Second Story.—To have one Helyer's shod hopper and bowl, to be supplied from service tank, to hold two gallons and cistern of thirty gallons, lined with copper, with all traps and connections complete. Bowl to be leaded neatly under the seat and lead line the floor.

Tub.—One 16 oz. planished copper bath tub, with ⅝ inch compression nickel bath cocks, with plug, chain, chain-holder, &c., complete, and fitted perfectly with hot and cold water supply, waste and overflow.

Bowl.—One 15-inch basin with nickel-plated cocks, marble slabs, to be dished and have 10-inch back : fitted perfectly with hot and cold supply, waste and overflow.

Lead neatly the floor of the closet under the bowl, soldering securely around pipe.

Attic.—To line tank 3x2x2 with 16 oz. copper, and provide the same with ball, cock and valve, to shut off from distributing pipes.

BILL OF MATERIALS

To be used in dwelling-house for —— ——, according to Plans and Specifications furnished by Ralph A. Cram, Architect, Boston, Mass.

Excavation	cn. yds 900 c.
Stone Foundations	cu. ft. 3,000
Stone Underpinning	cu. ft. 300
Bricks	2,500
Framing. Spruce Lumber.	
4"x4"	ft. 400
2"x4"	" 2,800
4"x8"	" 250
6"x8"	" 225
4"x6"	" 100
2"x8"	" 750
Spruce outside boarding	sq. ft. 7,500
Spruce flooring	" 2,500
Hard pine flooring	" 325
Plastering	sq. yds. 520
Laths	9,000
Shingles	20,000
Clapboards	3,000

Estimated Cost of this Cottage is $1,650.

Stability of Piers and Buttresses.

BY F. E. KIDDER, B. C. E.

A PIER or buttress may be considered stable when the forces acting upon it do not cause it to rotate, or "tip over," or any course of stones or brick to slide on its bed. When a pier has to sustain only a vertical load, it is evident that the pier must be stable, although it may not have sufficient strength.

It is only when the pier receives a thrust, such as that from a rafter, or an arch, that its stability must be considered.

In order to resist rotation, we must have the condition that the moment of the thrust of the pier about any point in the outside of the pier shall not exceed the moment of the weight of the pier about the same point.

To illustrate, let us take the pier shown in Fig. 1.

Let us suppose that this pier receives the foot of a rafter, which

exerts a thrust T in the direction A B. The tendency of this thrust will be to cause the pier to rotate about the outer edge at b; and the moment of the thrust about this point will be T x a_1 b_1, a_1 b_1 being the arm. Now that the pier shall be just in equilibrium the moment of the weight of the pier about the same edge must just equal T x a_1 b_1. The weight of the pier will of course act through the center of gravity of the pier, which in this case is at the center; and in a vertical direction, and its arm will be b_1 c, or one half the thickness of the pier.

Hence to have equilibrium we must have the equation

$$T \; x \; a_1 \; b_1 = W \; x \; b_1 \; c.$$

But under this condition the least additional thrust, or the crushing off of the outer edge, would cause the pier to rotate, hence to have the pier in safe equilibrium we must use some factor of safety.

This is generally done by making the moment of the weight

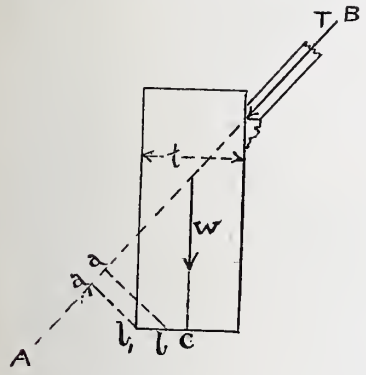


Fig. 1

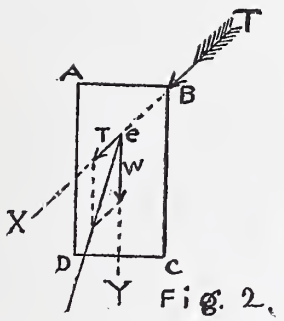


Fig. 2.

equal to that of the thrust when referred to a point in the bottom of the pier, a certain distance in from the outer edge.

This distance for piers or buttresses should not be less than $\frac{1}{4}$ of the thickness of the pier.

Representing this point in the figure by b we have the necessary equation for the safe stability of the pier,

$$T \; x \; a \; b = W \; x \; \tfrac{1}{4} \; t.$$

t denoting the width of the pier.

We cannot from this equation determine the dimensions of a pier to resist a given trust, because we have the distance a–b_1 t, and W, all unknown quantities. Hence we must first guess at the size of the pier, then find the length of the line a–b, and see if the moment of the pier is equal to that of the thrust. If it is not, we must guess again.

Graphic method of determining the stability of a pier or buttress.

When it is desired to determine if a given pier or buttress is capable of resisting a given thrust, the problem can easily be solved graphically, in the following manner.

Let A B C D, Fig. 2, represent a pier which sustains a given thrust T at B.

To determine whether the pier will safely sustain this thrust, we proceed as follows.

Draw the indefinite line B x in the direction of the thrust. Through the center of gravity of the pier (which in this case is at the center of the pier) draw a vertical line until it intersects the line of the thrust at e. As a force may be considered to act anywhere in its line of direction, we may consider the thrust and the weight to act at the point e, and the resultant of these two forces can be obtained by laying off the thrust T from e on e–x, and the weight of the pier W, from e on the line e–y, both to the same scale (lbs. to the inch), completing the parallelogram, and drawing the diagonal. If this diagonal prolonged cuts the base of the pier at less than one-fourth of the width of the base, from the outer edge, the pier will be unstable, and its dimensions must be changed.

The stability of a pier may be increased by adding to its weight, (by placing some heavy material on top) or by increasing its width at the base, by means of "set offs" as in Fig. 3.

Figs. 3 (A and B) show the method of determining the stability of a buttress with offsets.

The first step is to find the vertical line passing through the center of gravity of the whole pier. This is best done by dividing the buttress up into quadrilaterals, as A B C D, D E F G, and G H I K. Fig. 3A: finding the center of gravity of each quadrilateral by the method of diagonals, and then measuring the perpendicular distances X_1, X_2, X_3 from the different centers of gravity, to the line K–I.

Multiply the area of each quadrilateral by the distance of its center of gravity from the line K–I, and add together the areas and the products. Divide the sum of the latter by the sum of the former, and the result will be the distance of the center of gravity of the whole buttress from K–I. This distance we denote by X_0.

Example. Let the buttress shown in Fig. 3A, have the dimensions given between the cross marks. Then the area of the quadrilaterals and the distances from their centers of gravity to K-I would be as follows:

1st area	= 35 sq. ft.	X_1	= 0′.95	1st area × X_1	= 33.25
2d "	= 23 "	X_2	= 2′.95	2d " × X_2	= 67.85
3d "	= 11 "	X_3	= 4′.95	3d " × X_3	= 54.45
Total area	69 sq. ft.			Total moments	155.55

The sum of the moments is 155.55 and dividing this by the total area, we have 2.25 as the distance X_0. Measuring this to the scale of the drawing from K–I, we have a point through which the vertical line passing through the center of gravity must pass. After this line is found the method of determining the stability of the pier is the same as that given for the pier in Fig. 2. Fig. 3B also illustrates the method. If the buttress is more than one foot thick (at right angles to the plane of the paper) the cubic contents of the buttress must be obtained to find the weight. It is easier, however to divide the real thrust by the thickness of the buttress, which gives the thrust per foot of buttress.

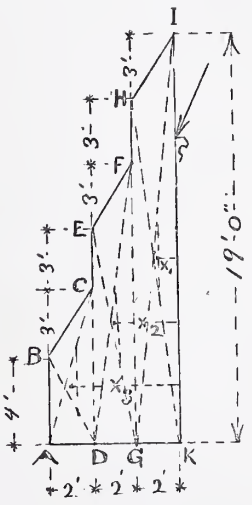


Fig. 3 A.

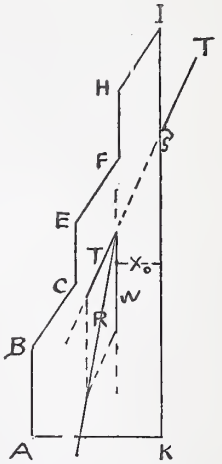


Fig. 3 B

Line of Resistance.—Definition.—The Line of resistance, or of pressures, is a line drawn through the center of pressure of each joint.

The *Center of Pressure* of any joint is the point where the resultant of the forces acting on that portion of the pier above the joint, cuts it.

The line of pressures, or of resistance, when drawn in a pier, shows how near the greatest stress on any joint comes to the edges of that joint.

It can be drawn by the following method.

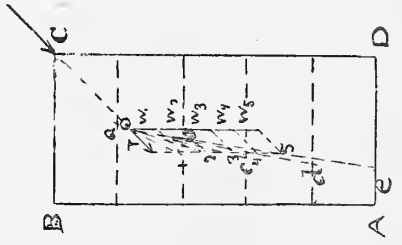


Fig. 4.

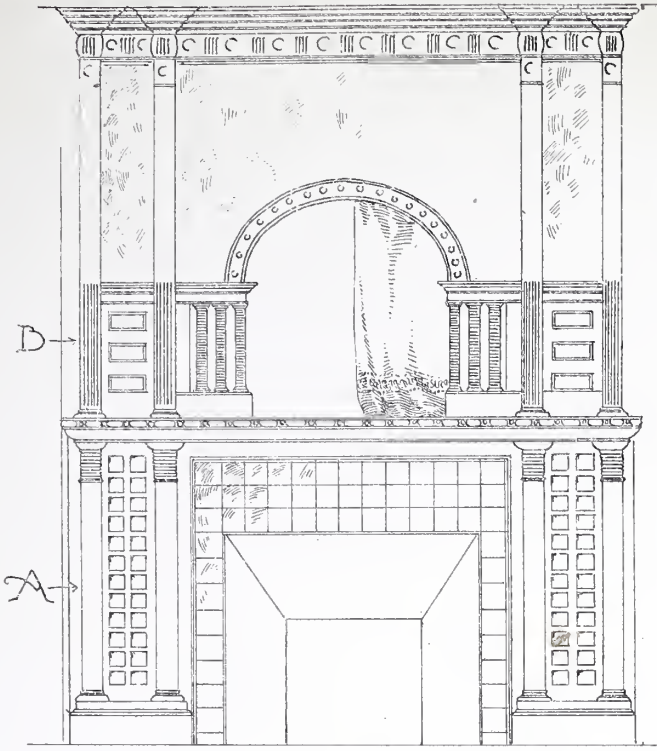
Let A B C D (Fig. 4) be a pier whose line of resistance we wish to draw. First divide the pier in height, into portions two or three feet high. by drawing horizontal lines. It is more convenient to make the portions all of the same size.

Prolong the line of the thrust and draw a vertical line through the center of gravity of the pier, intersecting the line of thrust at the point a. From a log off to a scale, the thrust T, and the weights of the different portions of the pier, commencing with the weight of the upper portion. Thus w_1 represents the weight of the portion above the first joint, w_2 represents the weight of the second portion and so on. The sum of the w's will equal the whole weight of the pier.

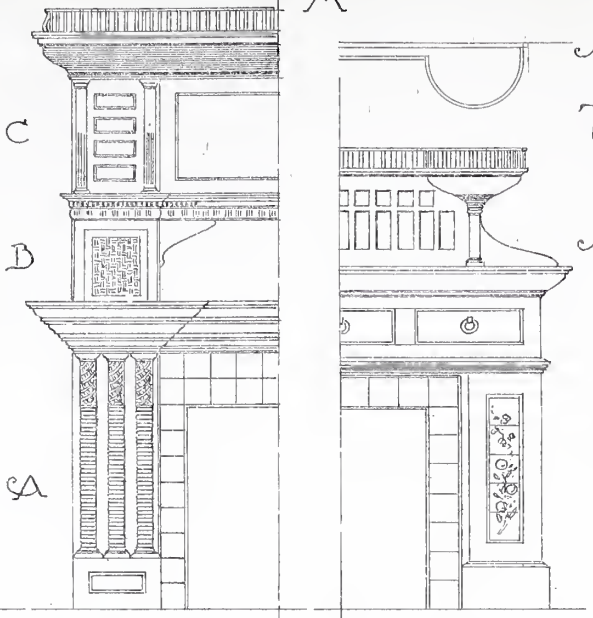
Having proceeded thus far, complete a parallelogram with T and w for its two sides. Draw the diagonal and prolong it. Where it cuts the first joint will be a point in the line of resistance. Draw another parallelogram with T and $w_1 + w_2$ for its two sides. Draw the diagonal intersecting the second joint at b. Proceed in this way, when the last diagonal will intersect the base in e. Join the points a, b, c, d and e, and the resulting line will be the line of resistance.

We have taken the simplest case as an example, but the same principle is true for any case.

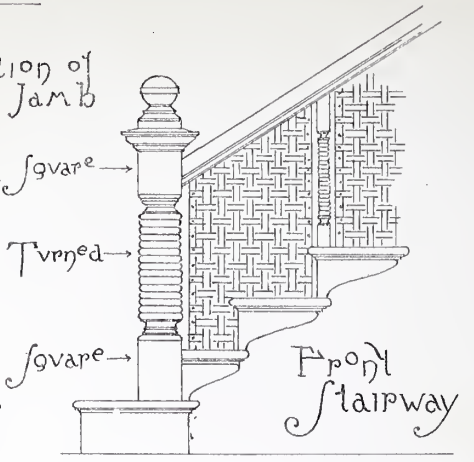
PLATE No. 52



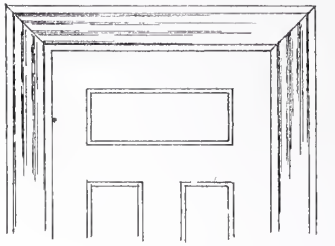
Mantel in Dining Room

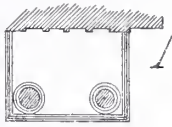


Section of Jamb



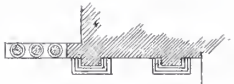
Front Stairway



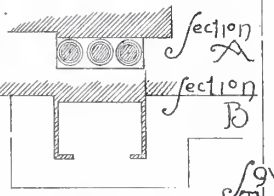


Plan A.

Mantel in Hall



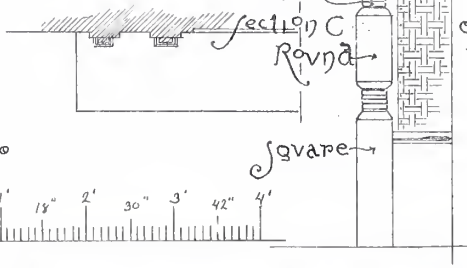
Plan B.



Mantel in Chamber.

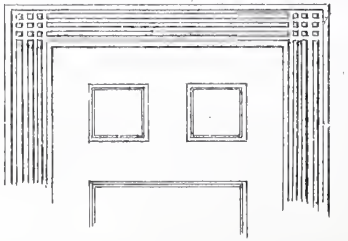
Section of Jamb

Doors on Second Story.



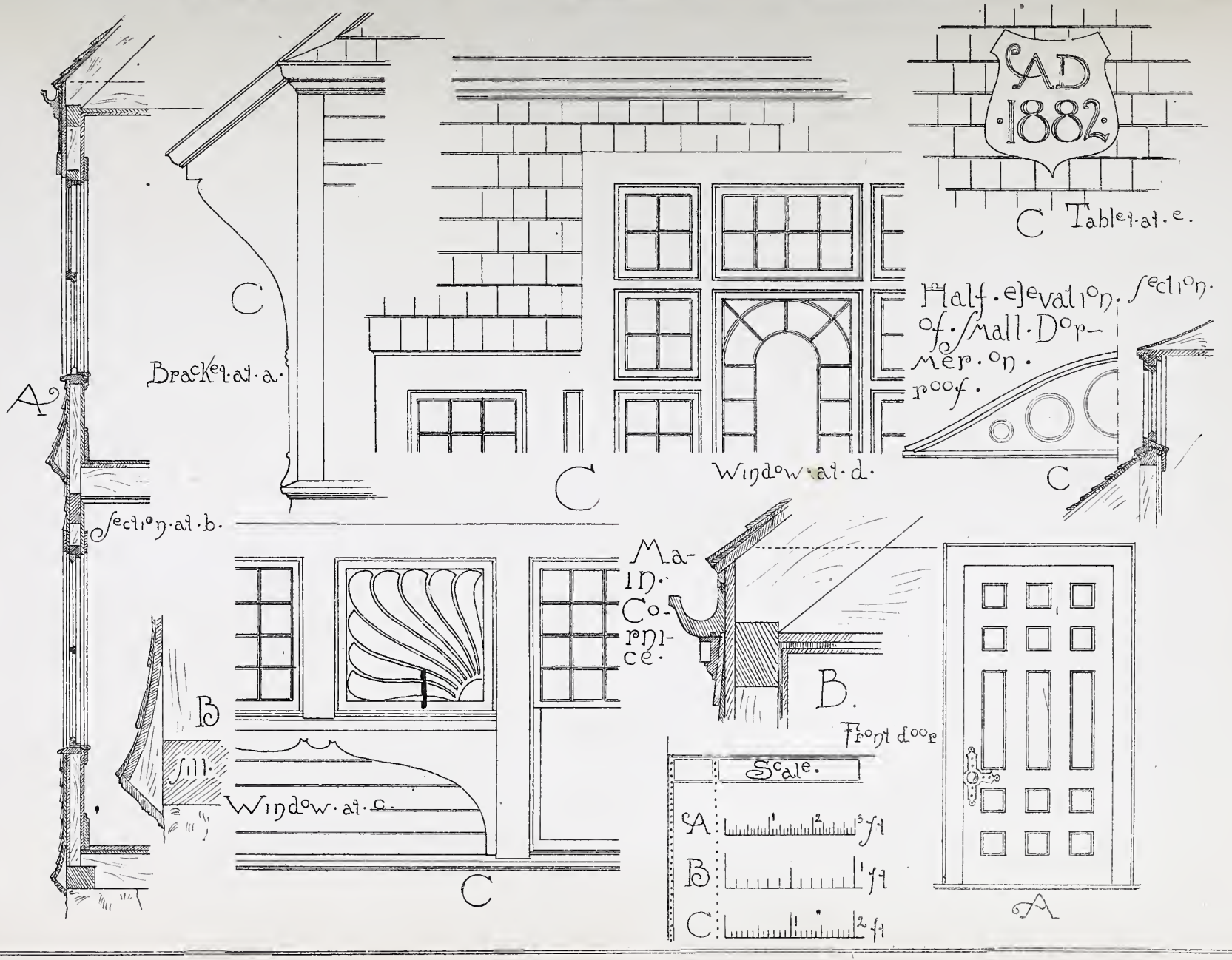
Attic Stairway

Doors on First Story.



Details of the Inside Finish.

Scale.


A
Bracket at a.
C
Section at b.
B
Sill.
Window at c.
C
Window at d.
C
A.D. 1882.
C Tablet at e.
Half elevation of small Dormer on roof.
Section.
C
Main Cornice.
B.
Front door
Scale.
A
B
C
A

Should the line of resistanee of a pier at any point approach the outside edge of the joint nearer than one quarter the width of the joint, the pier should be considered unsafe.

As an example embracing all the prineiples given in this paper we will take the following case.

Example II.—Let Fig 5 represent the seetion of a side wall of a ehureh, with a buttress against it. Opposite the buttress on the inside of the wall is a hammer-beam truss, which we will suppose exerts an outward thrust on the walls of the church amounting to about 9,600 lbs. We will further eonsider that the resultant of the thrust aets at P, and at an angle of 60° with a horizontal. The dimensions of the wall and buttress are given in Fig. 5A, and the buttress is 2 feet thiek.

Question.—Is the buttress sufficient to enable the wall to withstand the thrust of the truss?

The first point to decide is, if the line of resistance euts the joint C D at a safe distanee in from C. To ascertain this we must find the eenter of gravity of the wall and buttress above the joint C. D. We ean find this easiest by the method of moments around K M, (Fig. 5A) as already explained.

The distanee X_1 is of course half the thickness of the wall or one foot. We next find the eenter of gravity of the portion C E F G, (Fig. 5A) by the method of diagonals and sealing the distance X_2 we find it to be 2.95 feet.

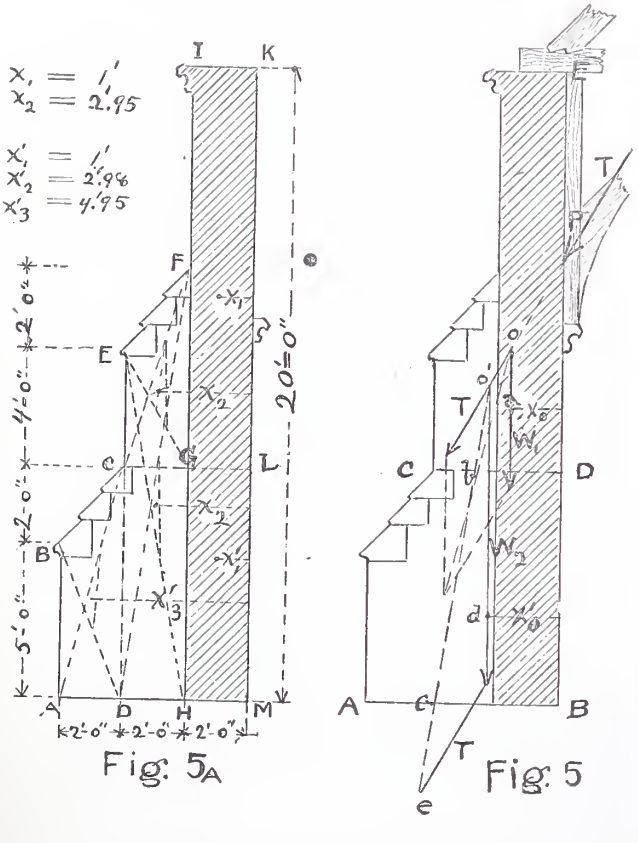
The area of C E F G $= A_2 = 10$ square feet; and of G I K L $= A_1 = 26$ square feet.

Then we have

$X_1 = 1$	$A_1 = 26$	$A_1 \times X_1 = 26$
$X_2 = 2.95$	$A_2 = 10$	$A_2 \times X_2 = 29.5$
	36	36)55.5

$$X_0 = 1.5$$

Or the eenter of gravity is at a distance 1.5 foot from the line E D (Fig. 5). Then on Fig. 5 measure the distanee $X_0 = 1.5$ foot and through point a draw a vertieal line interseeting the line of the thrust prolonged at O. Now if the thrust is 9,600 lbs. for a buttress two feet thiek, it would be half that, or 4,800 lbs. for a buttress one foot thick. We will call the weight of the masonry of whieh the buttress and wall is built 150 lbs. per eubie foot. Then the thrust is equivalent to 4,800÷150, or 32 eubie feet of masonry. Laying this off to a scale from O, in the direetion of the thrust, and



the area of the masonry, 36 square feet from O on the vertical line, eompleting the reetangle and drawing the diagonal we find it euts the joint C D at b, within the limits of safety.

We must now find were the line of resistanee euts the base A B.

We must now find the center of gravity of the whole figure, whieh is found by aseertaining the distanees X'_2, X'_3 in Fig. 5A, and making the following computation:

$X'_1 = 1'$	$A'_1 = 40$	$A'_1 \times X'_1 = 40$
$X'_2 = 2'.98$	$A'_2 = 24$	$A'_2 \times X'_2 = 71.52$
$X'_3 = 4'.95$	$A'_3 = 12$	$A'_3 \times X'_3 = 59.40$
	76	76)170.92

$$X'_c = 2.25$$

Then from the line E B (Fig. 5), lay off the distance $X'_c = 2'.25$, and draw through d a vertical line intersecting the line of the thrust at O'. On this vertieal from O', measure down the whole area 76, and from its extremity lay off the thrust T = 32 at the proper angle. Draw the line $o\ e$ intersecting the base at e. This is the point where the line of resistance euts the base, and as it is at a safe distanee in from A, the buttress has suffieient stability.

If there were more offsets, we should proceed in the same way, finding where the line of resistanee cuts the joint at the top of each offset. The reason for doing this is because the line of resistance might cut the base at a safe distanee from the outer edge, while higher up, it might eome outside of the buttress, so that the bnttress would be unstable.

The method given in these examples is applicable to piers of any shape or material.

Should the line of resistanee make an angle less than 30° with any joint, it might cause the stones above the joint to slide on their bed. This ean be prevented either by dowelling, or by inclining the joint.

It is very seldom in architeetural constrnetion that sueh a ease would occur, however.

A Solid Building.

AMONG the numerous large and eostly buildings which have been erected in this eity during the past two or three years, is one on the eorner of Franklin street and West Broadway, which has just been completed for Messrs. Francis H. Leggett & Co., wholesale groeers.

It has a frontage on Varick street of 86 ft. 4 in., 89 ft. 7 in. on Franklin street, and 74 ft. 3 in. on West Broadway.

The building is irregular in shape, covering an area of four eity lots, is nine stories high, exelusive of the eellar, and is bnilt of Trenton pressed briek.

The entire first story on all three streets is of rock-faeed "Hallowell" granite, eut with a batter of 10 inches, giving the building a remarkably solid and massive appearanee, which is further enhaneed by the heavy buttress piers above, and the heavy granite sills and lintels of the windows.

The granite work was done by the Hallowell Granite Co. of Maine.

The 9th story is in the French roof extending around the entire building, with the exception of the eorner of Franklin street and West Broadway, whieh is oeeupied by a granite tower with an iron roof filled in with fire-proof bloeks and slated. The top of this tower is 150 ft. above the eurb, and the building itself is 120 ft. high. One of the features of this strueture is the cellar, the finished floor of which is 3 ft. below tide-water; in sounding for bottom, the builder found first a layer of earth, then one of sand, nnder which were the remains of a forest of eedars that at one time had evidently stood there; this was followed by a layer of jelly like elay and finally a gravel bottom, down to whieh the piles were driven; there are 1,200 of these, ranging in length from 9 ft. up to 22. ft.

Considerable diffieulty was experieneed with the water, but this was obviated by the liberal use of eement conerete.

The eellar floor is of eonerete 2 ft. thiek, and is now perfeetly dry.

The vault extends to the eurb on all three streets and is covered with large granite slabs 12 in. thiek; the patent light stoop runs around the entire building and is 5 ft. wide.

The interior of the building is in the same massive style whieh eharaeterizes the outside, the timber being 4 in. x 14 in., plaeed 14 in. from eenters, and earried on 14 in. x 14 in. girders, all of Georgia pine. The girder piers in eellar are of granite, many of them being in one stone.

1st and 2d story girder eolumns are of iron and above that they are of white oak 14 in. square; eaeh floor is able to earry 1,000 lbs. to the square foot.

There are five of Otis' steam elevators in the building, the engines for whieh are plaeed on the 5th floor. The boilers for running elevators, eleetrie light maehine and heating are of 100 horse-power, and are loeated in the vault on Variek street.

The offiees and sales rooms oeeupy the entire 2d story, whieh is handsomely fitted up.

The building cost, exelusive of the ground, $230,000; ground eost $100,000. The mason for this job was John Keleher, earpenter, John Smith, and eontraetor, for iron work, Messrs. Blake and MeMahon, and Geo. W. da Cunha, of 111 Broadway, New York was the arehiteet.

It is without exeeption the strongest building of its kind ereeted in this eity, if not in the United States, and is one of the few nine or ten story strnetnres put up in the past two or three years whieh has not a broken sill, lintel or band eourse from eellar to roof.

Questions.

63. Moldings.—If some of your artists would give us a plate now and again of moldings, suitable for cabinet work, it would be appreciated by—Ed. H—.

64. Steel Square.—Can any one inform me whether or not steel squares may be found in this country with the outside edges divided into tenths, and if so, at what price are they sold?—J. M. B.

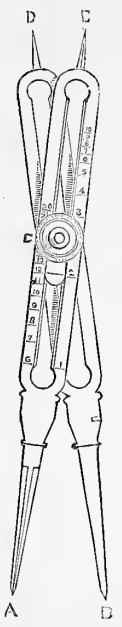
65. Books.—Having graduated from a scientific college and spent a couple of years at engineering, I wish to take up a course of reading and study on architecture. I desire to purchase a set of books which shall give me a good insight to the business, and which while they do not deal too much with the elementary points, shall not commence at too advanced a stage. Can you or any fellow reader give me, through the columns of your journal, advice in selection, and information as to prices? Can you tell me of any books which embrace the matter in Warren's Series, but which state it in a better and more extended manner? What text-book would you recommend on perspective in architecture, and can you supply it? How can I obtain a copy of the building laws of Boston?—Inquirer.

66. Miscellaneous.—(1.) Will you please tell how cherry is finished to look like mahogany—or rather what is the stain that is used on both woods to make them a dark red as is now seen in furniture? (2.) Can such stain be used after wood has been oiled? (3.) What stain is used on maple to make it almost a mouse color as is seen in the birdseye maple placques that are found in art stores? (4.) What finish do artists put on wood carving; do they use shellac? If simply oiled it catches dust wonderfully and clings to it with tenacity. (5.) What color may be used in the sand coat or last coat of plaster to give it a cream shade how used, and what proportion? (6.) Will you be so good as to give illustration of one or two styles of wainscoting, I want for hall and dining room, wish to use panels of cherry with remainder of wood oak, shall do surface covering on panels. (7.) I wish you would give cut or refer me to some work where I could get idea of newel posts; I want substantial square ones, no nonsense or filagree about them. Style of stairs, platform landing. (8.) *Sometime* will you publish *cuts* of *wood* coal boxes, I wish to cover one, am told somewhere there are cuts of some.—M. E. G

Answers.

53. Dairy.—The principal points to be looked to in the construction of a dairy is that it should be cool, dry, and well ventilated. The walls should be thick and no glass whatever in its apertures except for winter use. The window openings should be high, narrow, and covered with wire gauze inside to exclude insects, and with thin canvass blinds outside, which in very hot weather may be kept saturated with water. Each opening should have an internal shutter to exclude or temper the light when required on very bright days. The windows should open on the sunny side as the rays of the sun purify the air and assist ventilation. Sashes, glazed with thick rough glass should be provided for winter. The roof should have a space to contain air between the outer boarding and ceiling. The floor should be of cement and incline each way to the center, so as to form a channel for the water to discharge through a trapped grating. The dairy should be divided into two parts, one for churning and washing. It should be provided with a sink and a supply of soft water. A flue should be provided for the use of a stove in winter in this apartment. For the shelves, slate, thick rough glass or earthenware slabs form the best material, although white wood boards if washed daily and aired answer the purpose as well. Ice should never be used, there is always danger of a reaction and consequently danger of fermentation. If the walls are sufficiently thick, and the heat excluded from coming in at the roof, a dairy can always be kept at a temperature of from 60° to 62°.—Neff.

54. Proportional Compasses.—If John B. will obtain a copy of "Drawing Instruments, how to use them, and how to take care of them," price 25 cents, he will find the information he asks for. I send you an item on the subject taken from the work. I also send drawing of compasses so that your reader may be enabled to understand the subject from the text given. The compasses are chiefly used for the enlargement or reduction of drawings. The simplest form is that named wholes and halves, which has legs of the regular form on both ends, held together with a box-screw, which is placed one-third the whole length from one end; this instrument can be used to make a drawing of either double or half the size of a given copy.



The proportional compasses, properly so-called, is a more complicated contrivance, and admits of more varied application. It is in principle the same as the whole-and-halves, with this difference that the screw-joint, C, passes through slides moving in the slots of the bars, and admits of the center being adjusted for various relative proportions between the openings, A B and D E. The scales usually engraved on these compasses are named lines, circles, planes, and solids. The scale of lines is numbered from 1 to 10, and the index slide being brought to any one of these divisions, the distance, D E, will measure A B in that proportion. Thus, if the index be set to 6, D E will be contained six times in A B. The line of circles extends from 1 to 20; and if the index be set to 10, D E will be the tenth part of the circumference of the circle whose radius is A B. The line of planes, or squares, determines the proportion of similar areas. Thus, if the index is placed at 3, and the sides of any one square be taken by A B from a scale of equal parts, D E will be the side of another square of one-third the area. And if any number be brought to the index, and the same number be taken by A B from a scale of equal parts, D E will be the square root of that number. And in this latter case, D E will also be a mean proportional between any two numbers whose product is equal to A B. The line of solids expresses the proportion between cubes and spheres. Thus, if the index be set at 2, and the diameter of a sphere or side of a cube be taken from a scale of equal parts by A B, then will D E be a diameter of a sphere or side of a cube of half the solidity. And if the slide be set to 8, and the same number be taken from a scale of equal parts, then will D E measure 2 in the same scale, or the cube root of 8. The scale of lines and that of circles are those of most value to the draughtsman. The first enables him to reduce or enlarge in any required proportion; and the second gives him the side of a square or polygon that can be inscribed in a given circle. Great care must be observed in using this instrument, for should a point get broken or worn off in the slightest degree, the whole instrument is rendered useless.—Adept.

55. Boiler Chimneys.—Perhaps the following, which is clipped from a work on the subject, may suit "Pittsburg Bricklayer:

The object of a chimney is to convey away smoke and produce a draught—that is a current of fresh dry air—through the coals on the grate. This draught is produced by the difference in the specific gravity of the air inside and outside of the chimney. If the quality of the gases inside and outside were always the same, formula could be established for the size of chimneys with some degree of accuracy. The gases inside a chimney are mostly composed of atmospheric air, free nitrogen, carbonic acid, carbonic oxide, steam, free hydrogen, free carbon, sulphuric acid, and other elements. If the relative amount of these gases and their temperatures were always the same, there would not be much difficulty in determining the proportions; but as these conditions are continually changing, as well by the gradual consumption of coal on the grate as by the management of the fireman, it is impossible to arrive at any exact conclusions. The air outside is also continually undergoing changes. For marine boilers the general rule is to allow 14 square inches area of chimney for each nominal horse-power; for stationary boilers the area of the chimneys should be one-fifth greater than the combined area of all the flues or tubes. In boilers provided with any other means of draught, such as a steam jet or a fan-blower, the dimensions of the chimney are not so important as in cases where the draught is produced solely by the chimney.

Rule for finding the Required Area for any Boiler.—Multiply the nominal horse-power of the boiler by 112, and divide the product by the square root of the height of the chimney in feet. The quotient will be the required area in square inches.

TABLE SHOWING THE PROPER DIAMETER AND HEIGHT OF CHIMNEY FOR ANY KIND OF FUEL.

Nominal Horse-power of Boiler.	Height of Chimney in feet.	Inside Diameter at top.	
		American.	Armstrong's.
10	60	1ft. 2in.	1ft. 6in.
12	75	1ft. 2in.	1ft. 8in.
16	80	1ft. 4in.	1ft. 10in.
20	99	1ft. 5in.	2ft. 0in.
30	105	1ft. 9in.	2ft. 6in.
50	120	2ft. 2in.	3ft. 0in.
70	120	2ft. 6in.	3ft. 6in.
90	120	2ft. 10in.	4ft. 0in.
120	135	3ft. 2in.	4ft. 6in.
160	150	3ft. 7in.	5ft. 0in.
200	165	3ft. 11in.	5ft. 6in.
250	180	4ft. 4in.	6ft. 0in.

K.

PLATE No. 54

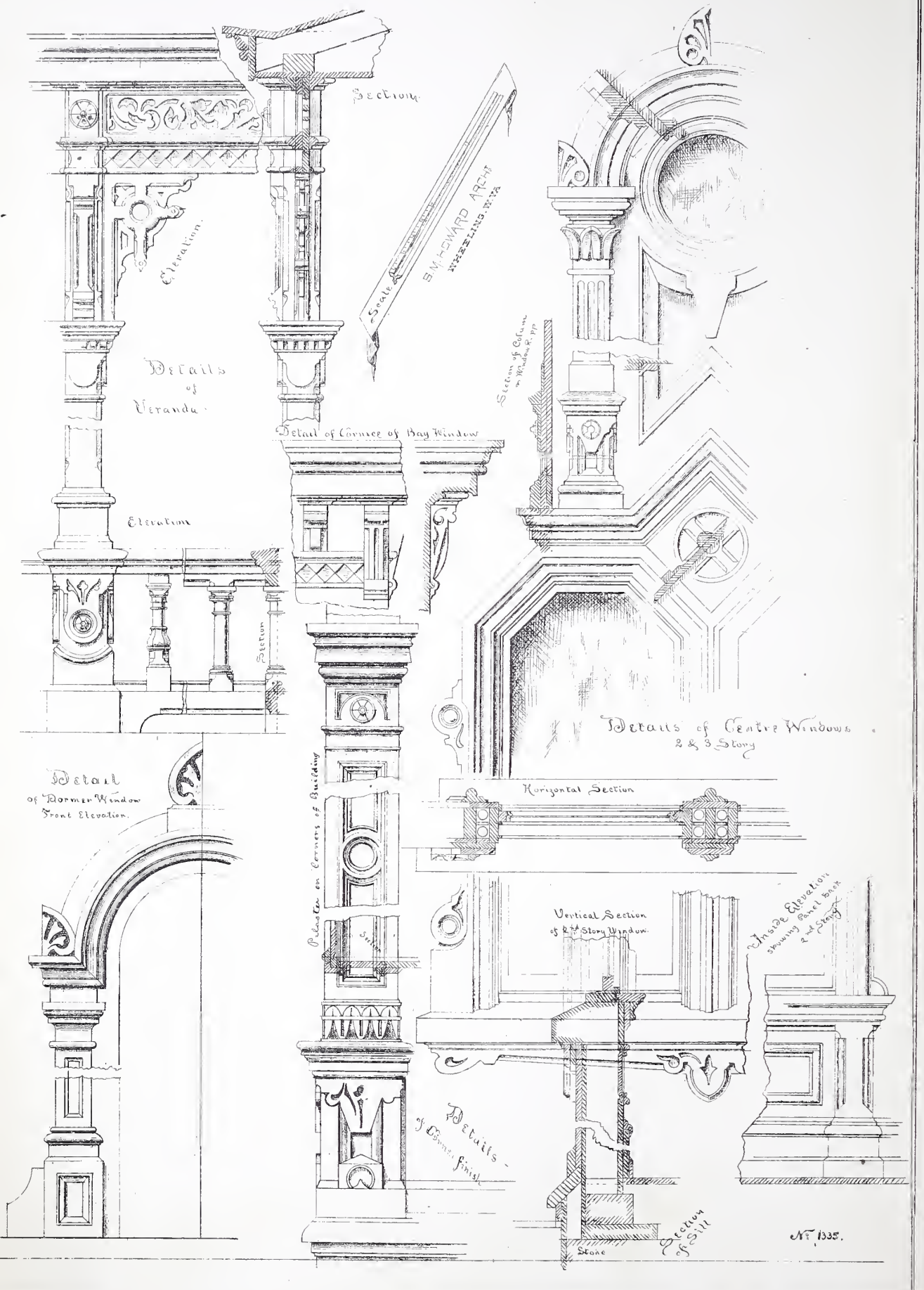
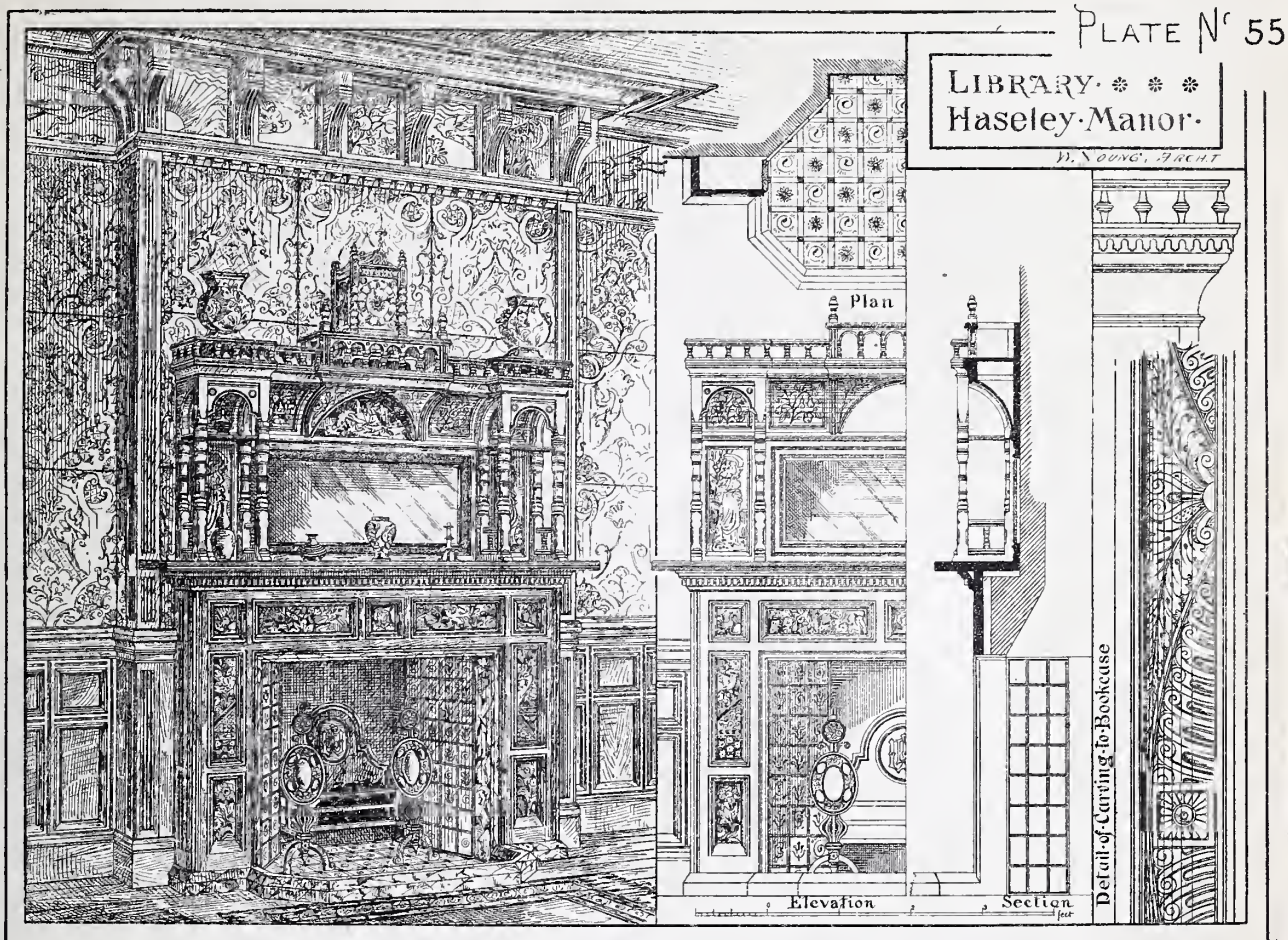
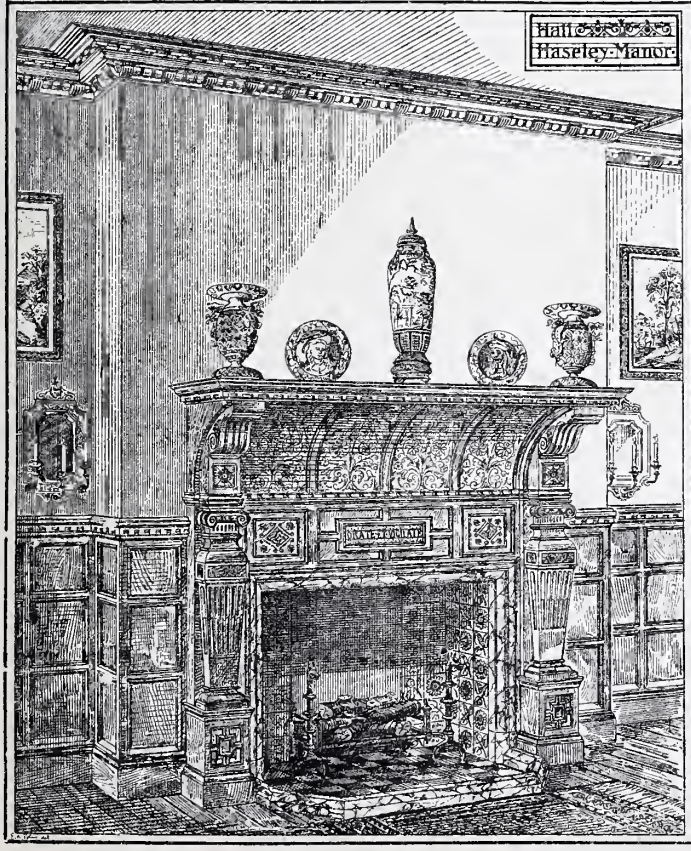
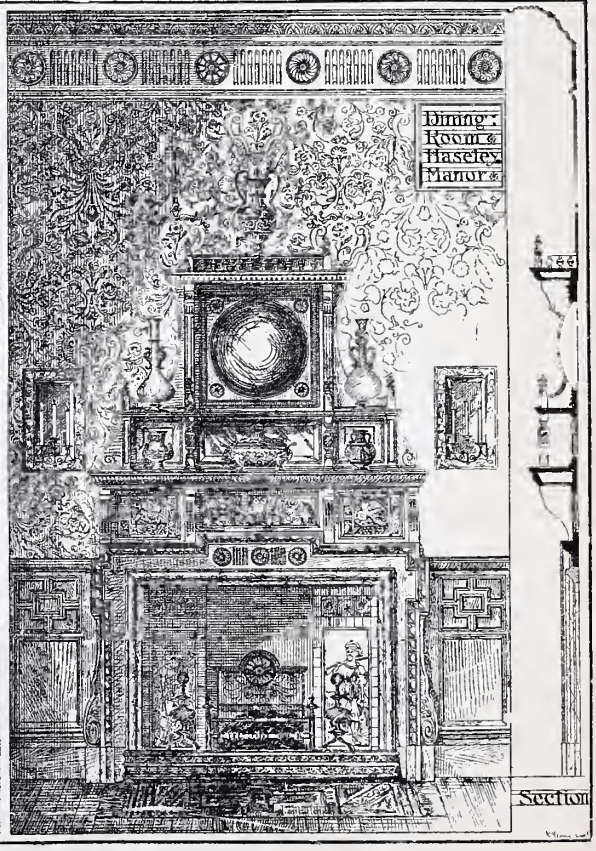

Section
Elevation
Scale
B.M. HOWARD ARCH
WHEELING W.VA.
Details of Veranda
Detail of Cornice of Bay Window
Section of Column in Window P. 55
Elevation
Section
Details of Centre Windows 2 & 3 Story
Detail of Dormer Window Front Elevation
Horizontal Section
Pilaster on Corners of Building
Section
Vertical Section of 2nd Story Window
Inside Elevation showing Panel back 2nd Story
Details of Cornice Finish
Section of Sill
Stone
No. 1335.

PLATE Nº 55







DESIGNS BY W.m YOUNG, ARCHT.

56. COLORING DRAWINGS.—Make use of the best colors only; do not mix with too little water; if the first coat is not dark enough, wait till dry, and give another coat. Make up your mind what portion you are going to color before applying a drop of paint; do not stop in the middle of a wash, but when once the brush touches the paper, go straight through with the portion you begin. If obliged to leave the job for a minute, paint up to a line; a dotted line will do if there is not a "full" one handy; this will hide the join between the two patches of color. Do not let your brush be too wet nor yet too dry; a few trials will soon show you the right amount of color to take up. Use the best English drawing paper; if you then find any trouble a little prepared ox-gall mixed with the color will do wonders. Clouded drawings, as a rule, are caused by letting the work dry and going over the edges again when starting afresh. No piece of coloring should be left until finished.—DRAFTSMAN.

57. PLUSH PANELS.—Place the material carefully over the wood panel with an edge formed of embroidered tissue. Black wood panels showing lovely painted designs are preferred by some. This mode abounds with odd fancies—animals, reptiles and all sorts of bugs are selected to be printed on door panels.—DECORATOR.

58. FURNITURE WOOD.—Although art furniture may be constructed of other than what we should term art woods, such woods themselves are clearly definable, for they are few in number. They may be enumerated as follows: those of the first rank being mahogany, rosewood, ebony and walnut, and those of the second rank oak, birch, pitch pine, satinwood and maple, whilst some other woods, such as cherry, might perhaps be properly included. We have made mention of oak, birch and pine, and we have pitch pine satinwood and maple yet to refer to. Pitch pine we do not regard as being a suitable wood for furniture making, as for such purpose it possesses two decided faults. The most important of these, perhaps, is that it wears dirty; the second fault is that it is too coarse a wood, both in texture and in appearance. Its markings are in many cases no doubt full of beauty, but the general effect which they produce is not sufficiently refined for art furniture, and in our opinion the wood is best suitable when used in the mass—thus for polished roofing or staircase work. In your case, perhaps, cherry would be the best sort of wood to use for inside finish. It is difficult, however, to decide what kind of wood would be best for you to employ in the absence of more information in regard to style of house, size and position of rooms, &c.—ARCHITECT.

59. BOOKS.—Write to E. & F. N. Spon, 44 Murray Street., N.Y. for particulars. The books meutioned are English and are very scarce in this country.—BROOKLYN.

60. VENTILATION.—Mr. Ruttan's system is that known as the "exhaust method." His plan is to draw off all the mephitic air from the bottom of a room and admitting the pure air in at the top. This is sometimes accomplished with the aid of an exhaust fan, in large buildings. The system has not been generally adopted as it is not so efficient as some of its advocates would lead us to suppose. It has its advantages, however, and in some instances has given good satisfaction. Mr. Ruttan's book, "Ventilation and Warming," discusses the method very thoroughly.—ADEPT.

61. DRAWING.—The following which is taken from "Drawing Instruments and How to use Them," will answer all H. B. B's. questions:

When it is intended to tint drawings with ink or colors, the following rules should be observed: (1.) The paper should have the superfluous sizing removed by being sponged lightly with clean water. (2.) The paper, and everything about it, must be kept perfectly clean. (3.) Line off the spaces with *very fine* pencil marks, that are to be tinted. (4.) Never use the eraser on the part to be tinted, either before or after the tinting. (5.) Try the tinting process on a piece of waste paper until the proper tint is obtained, before applying to the drawing. (6.) Dark tints are formed by applying a number of light ones over each other, but a second tint should not be applied until the first one is perfectly dry. (7.) Always finish tinting one portion of drawing before leaving it; otherwise it will be cloudy. (8.) See that the paper is damp before you begin to tint. (9.) Ink in all lines after the tinting is completed and the drawing is perfectly dry.

The colors used for representing wood, iron, and other materials, are as follows: For soft pine, a very pale tint of sienna: for hard pine, burut sienna with a little carmine added; for oak, a mixture of burnt sienna and yellow ocher is used. Mahogany is represented by burnt sienna and a portion of dragon's blood. For walnut, dragon's blood and burnt umber are used. For bricks, burnt sienna and carmine make a good color. Gray stones are represented by a mixture of black and white, with a little of Prussian blue and carmine added—pale ink alone is sometimes used for stone work. Brown freestone is represented by burnt sienna, carmine, and ink. Wrought iron is represented by a light tint of Prussian blue, and cast iron by a gray tint composed of black, white, and a little indigo. Brass is tinted with gamboge. Gamboge, slightly mixed with vermilion, makes a good color for copper. Silver is represented by an almost invisible blue.

In this use of Indian ink, the best for tinting and shading is fine grained, and has a brownish tint, and when newly broken has a dull golden appearance at the fracture. It is generally scented with musk or camphor, and is sometimes covered with gold leaf, or is highly polished, and covered with finely-executed Indian or Chinese characters. Cheap inks are generally known by their dull surface and coarseness of grain. Inks and colors should be wetted as little as possible, otherwise they will crack and crumble away. Indian ink is improved very much by mixing in with it a very small portion of blue. This will give the lines a dark black appearance.

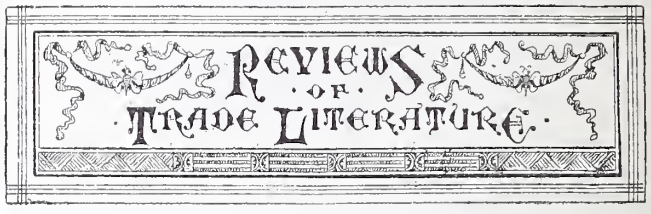
Bright clear lines are made by having the ink *very dark*.

Never intersect lines until the first lines drawn are dry.

Tapering lines are made by successive closings of the pen, or by a dexterity in adjusting its position to the paper and the pressure upon it.

I would advise H. B. B to procure the little work referred to above.—ADEPT.

Hereafter all questions sent in to this office will be answered under the head of "Chats with Correspondents." Unless they are of such a nature as to require answering by mail, in which case inclose stamps for return postage.—ED.



WE deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

Study-Book of Furniture and Furnishing. Being a series of fifty-six folio plates of designs, 12x17 inches, showing interiors, cabinet work, upholstery, and sundries. J. O'Kane, publisher. Price $10.00.

This series embraces over twenty perspective views of interiors of dining-rooms, drawing-rooms, bed-rooms, boudoir, library, halls, billiard-room, etc.; besides a number of elevations, showing cabinet-work with wall treatment. These interiors are all of modern design, after the Adams', Old English, Jacobean, Louis XIV., Egyptian, Mediæval and Modern Eclectic Styles. Many of them are very elaborately fitted, furnished and decorated, while others are on a plainer and more economic scale.

The cabinet-work embraces every variety of structure belonging to this branch; cabinets of all kinds, tables, mantels, side-boards, buffets, book-cases, chairs, wardrobes, suits for the various apartments, desks, mantel and pier glasses, and sundries. Besides these, there are over a hundred examples of upholstered chairs, sofas, settees and lounges; also ball, cane-seat, and office chairs, lambrequins and valances.

These plates are chiefly composed of reproductions from the latest and best designs of European artists, and are brim-full of original, quaint and artistic devices. The plates, typography, and general "get-up" of the work reflect credit on the publisher and all concerned. No modern designer of art furniture or interior decoration can afford to be without these excellent examples of art progress.

Some Difficult Problems in Carpentry and Joinery simplified and solved by the aid of the carpenters' steel square. Together with a full description of the tool, and explanations of the scales, lines and figures on the blade and tongue, and how to use them in every-day work. Showing how the square may be used in obtaining the lengths and bevels of rafters, hips, groins, braces, brackets, purlins, collar-beams, and jack-rafters. Also, its application in obtaining the bevels and cuts for hoppers, spring mouldings, octagons, diminished styles, etc., etc., etc. Illustrated by numerous wood-cuts. The Industrial Publication Company. Price, paper, 25 cents.

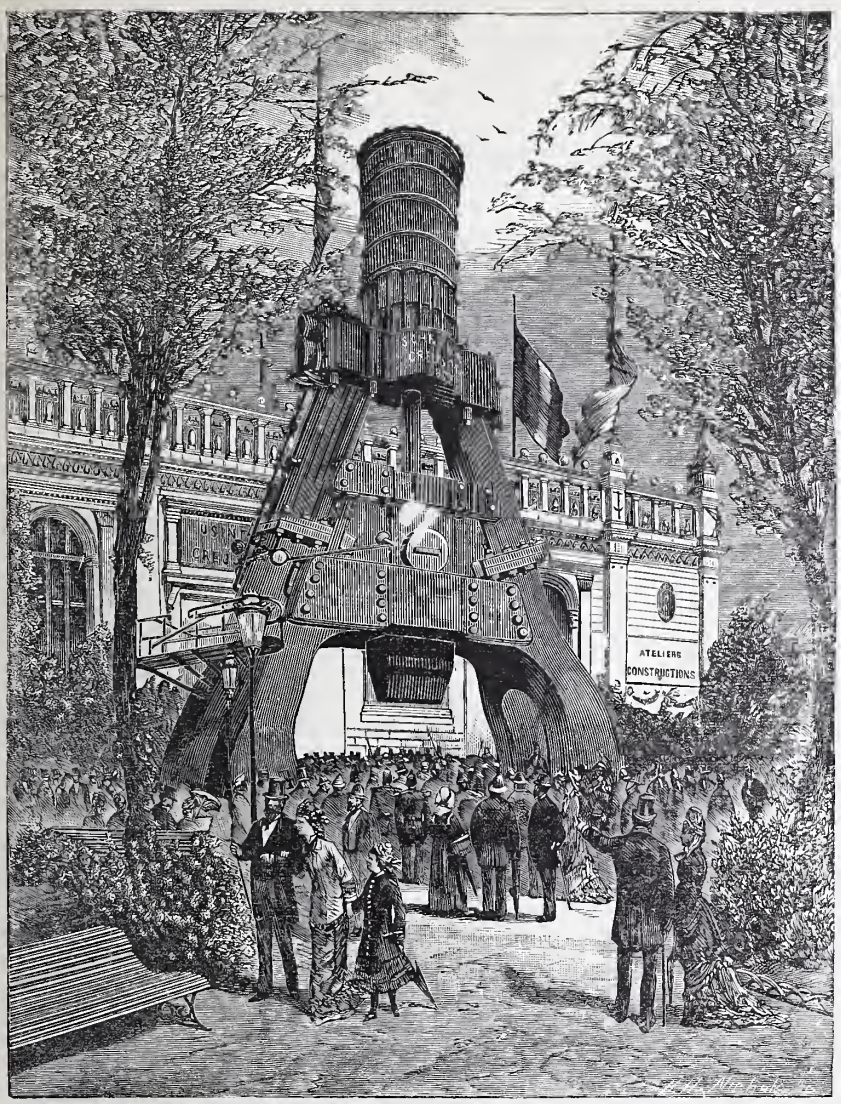
This is No. 5 of the "WORK MANUALS" published by this firm, and is simply an abridgement of the larger work on the same subject, with a few additional problems added.

The fundamental principles of the method of using steel squares are shown in this little work, and to those who have not leisure to study the larger work this will prove very acceptable, and its low price renders it easily attainable. A tool chest will hardly be complete without a copy of this, or the larger work in it.

Knight's New Mechanical Dictionary.—A description of tools, instruments, machines, processes, and engineering, with indexical references to technical journals. (1876–1880.) By Edward H. Knight, A. M., LL. D. To be completed in four sections, of 240 pages each, at $2.00 per section. Section one ready in June, 1882. Section two ready in August, 1882. Section three ready in October, 1882. Section four ready in December, 1882. Houghton, Mifflin & Co., Publishers, Boston, Mass.

Since the completion of Knight's American Mechanical Dictionary, in 1877, the progress made in the development of the mechanic arts is unprecedented in the history of the world. Not only in such striking and wonderful achievements as relate to the telephone, phonograph, and electric light, toward which popular attention is naturally drawn, but in every department of applied mechanics, there has been developed a fertility of resource in the adaptation of means to ends quite as marvelous and equally important in practical results. Achievement has outrun the most sanguine expectation, and with such rapidity that even the most recent records are found to be very deficient in supplying the special information most desired.

The hearty approval which Knight's American Mechanical Dictionary has received in all parts of the world has encouraged the publishers to issue an entirely new volume, thus continuing the record from the date at which the former work



THE CREUSOT EIGHTY-TON STEAM-HAMMER.

went to press, but carefully avoiding repetition, and aiming to furnish not only a satisfactory supplement to the original work, but a book which shall have an individual and separate value as a complete record of half a decade in the history of invention. From this fact it is evident that this volume forms an indispensable supplement to all works of reference upon mechanics now extant, as none of them cover the period mentioned.

The same method has been adopted in dealing with the subject matter in both works. First, each article appears in its proper alphabetical place, thus fulfilling the function of a Dictionary, in affording direct response to inquiry. Second, the items of information thus distributed throughout the work are classified in Special Indexes of the Art, Profession, or Manufacture to which they pertain. The book thus fulfills the function of a Cyclopædia, which is a collection of treatises.

The value of a work of reference depends largely upon its Index. When one has a question to ask of an ordinary Cyclopædia it is frequently very difficult to determine under which title or heading to look.

The author has invented a system of what he terms "Specific Indexes," by the use of which the inquirer is guided straight to the information he is in quest of, even though he be entirely ignorant of the name of a thing, and have but the most vague and general notion of its use. This is accomplished by grouping under the general title of each Science, Art, Trade or Profession a list or "Specific Index" of every article in the book bearing any relation to the subject in question. The titles of these Indexes are in turn grouped at the beginning of the book, so that by a glance one may determine which clew to follow.

The work treats of many thousand subjects, and is illustrated with over 2,500 carefully prepared engravings and numerous full-page plates, and for general typographical excellence, quality of paper, and printing it is unsurpassed. It may be bound uniform with any edition of the Knight's American Mechanical Dictionary, or with any Cyclopædia or other book of reference of the usual size and shape.

The merits of the forthcoming work may be understood and judged by the three vols. of the Dictionary that have preceded it.

The work is sold only by subscription in four sections, and can only be obtained from the publishers or their authorized agents

Vick's Illustrated Monthly Magazine for June, 1882, comes to us in its usual form, but we notice that its front page is bordered with black, out of respect to its founder and editor, James Vick, who died on the 16th of May, aged 64 years. James Vick was born in Portsmouth, England, but came to this country with his parents in his 15th year. During his boyhood he was a playmate of the late Charles Dickens. He was a type-setter by trade, and worked at the case by the side of the veteran journeyman, Horace Greeley. At an early period he assumed the managing editorship of the *Albany Cultivator*, and subquently various other rural journals. In 1850 Mr. Vick became engaged in the cultivation of choice flowers, which occupied his attention to the day of his death. He was very widely known throughout the United States and Europe. He was the largest dealer in flowers in the world.

The Bookkeeper's Companion.—J. G. Beidleman, publisher, Philadelphia, Pa. Price, 75 cents.—This work *shows at a glance* the whole system of keeping any set of books, and tells in an instant where each account belongs. No master-builder, bookkeeper or student should be without this remarkable work. It prevents mistakes, it saves time, and will prove a perfect boon to all those who are not adepts in the art of bookkeeping. Those of our readers who have need of such a work should send to the publisher for a circular.

"La Faustin," by Edmond de Goncourt, shortly to be issued by T. B. Peterson & Brothers, Philadelphia, is destined to create a profound sensation. It is an episode in the life of a great Parisian actress, said by the author to be Rachel, and is full of scenes, incidents and excitement peculiar to the social and theatrical circles of the French capital. The romance is in a high degree naturalistic, but is as refined as it is powerful and absorbing.

We have received a copy of the **Brick, Tile and Metal Review,** a monthly journal devoted wholly to building and sanitary news. It is neatly printed and well filled with original and selected matter of interest and practical value to Architects, Builders, Brick Manufacturers, Contractors, Masons, Plumbers, etc. We are informed that it has a fair circulation, and as the annual subscription is only FIFTY CENTS should think that no one interested either in building or building materials would fail to subscribe. The publishers claim that it is the only publication in the world representing the Brick, Tile and Clay industries, and both proprietors and workmen engaged in brick and tile making will find it almost invaluable. It is certainly a very cheap publication. Address GEO. E. WILLIAMS & Co., Box 1462, Pittsburgh, Pa.

The Philadelphia *Record* says: "Before another year rolls around there will be little left of the great Disston Saw Works at Front and Laurel streets. Since the founder of the house, the late Henry Disston, purchased a tract of land at Tacony, in the Twenty-third ward, and removed the file department of the works thither, the firm have been working with the intention of ultimately transferring the entire establishment to the country site. The Disstons soon reaped the advantages of the change in respect to the file manufactory, which was made five years ago. The business which was done in the narrow quarters of the Sixteenth ward works developed rapidly, until the present production of files is 700 dozens per day. The woodwork department was the next to go to Tacony, and in its wake, at a period not very remote, went the long saw branch of the concern. This leaves at the Front and Laurel streets works the circular saw and short saws departments, and during the present year additional buildings are to be erected at Tacony for the making of the circular saws. When the Disstons came to arrange for the erection of the new structures, they found that in order to provide ample accommodations for their business and its prospective gradual increase it would be necessary to purchase more land. Negotiations were opened with the heirs of the Green estate for 88 acres of land adjoining the Disston possessions, which already embraced 160 acres. The matter hung fire for some little time, but a bargain was finally struck by the Disstons paying the sum of $100,000 for the Green property. Building operations were begun in the spring and are now being rapidly prosecuted.

[WE invite all those of our readers who may have anything novel, curious, or interesting to say on the subjects we represent, to take part in this department. Hereafter all answers to queries will be given in this column, and we trust our friends will continue, as heretofore, to forward answers in reply to queries.]

AMATEUR TINKER should call at the Bridgeport Wood-filling Co.'s offices, No. 40 Bleecker street, New York, and ask for Wolff's ebony stain and varnish. He will find this just the thing he wants.—W. R.

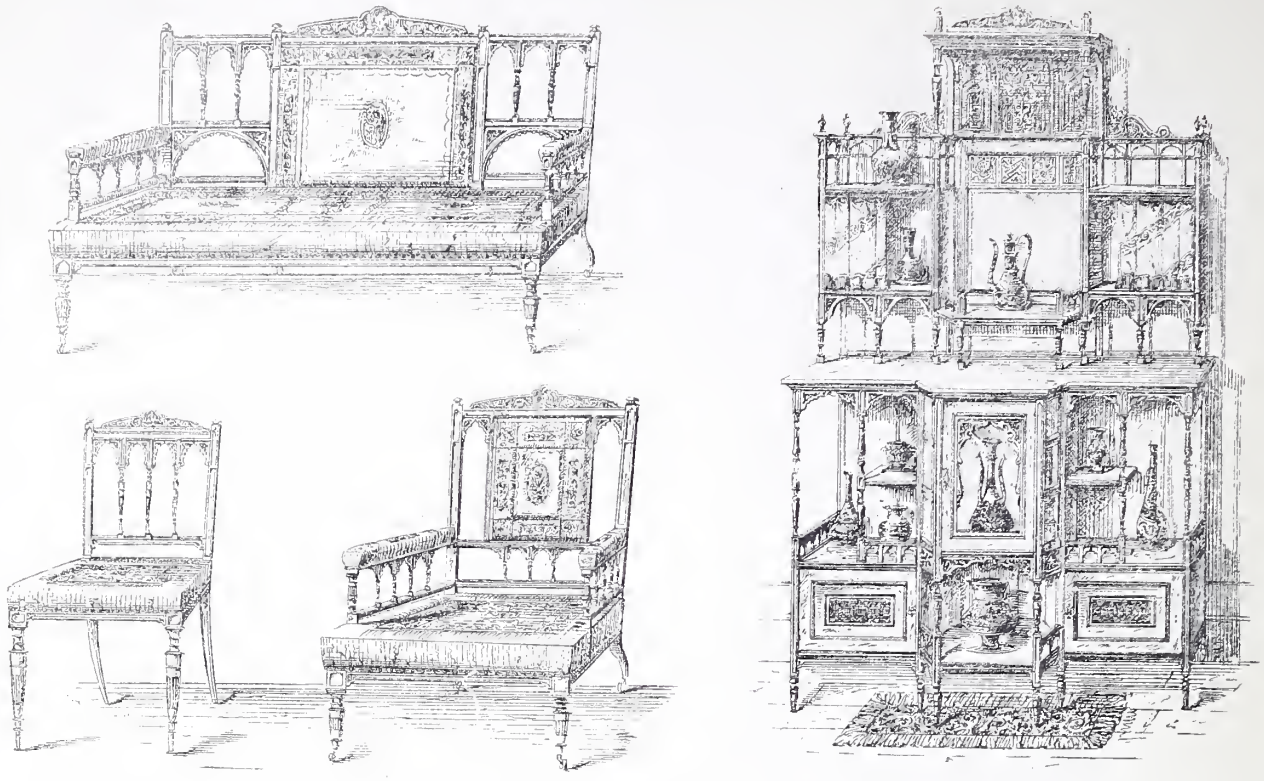
P. H.—You can make the thickest ordinary paper quite transparent by dampening it with pure, perfectly distilled benzine, and a design may be traced on it either with pencil or ink. When the benzine evaporates it leaves the paper white and opaque as before. If the evaporation takes place before the design is finished dampen it anew.

E. S. P. says: "Some years ago I occupied a store that was infested with rats; I tried traps and strychnine, which in fact killed off many, but for all that, did not exterminate them by any means. I was advised to use a trap again and catch one alive, put coal tar in his fur and let him escape. I did so, and have not seen a rat, or been troubled with them since, though this occurred 18 months ago."

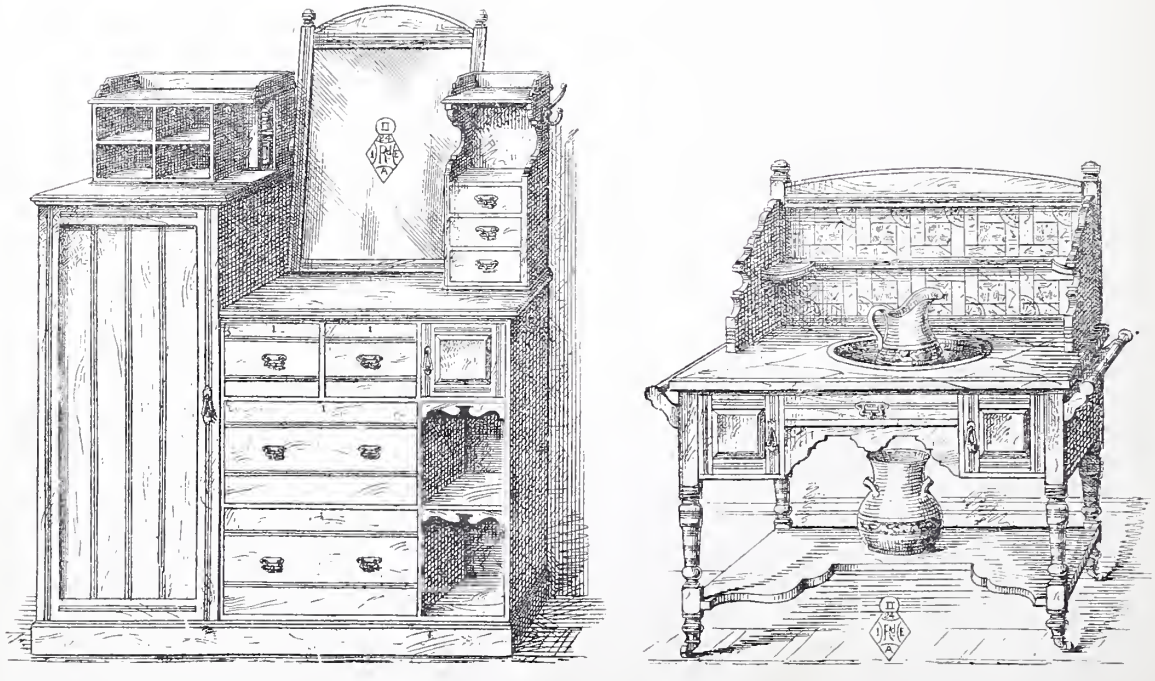
R. S. If you wish to make slips of your broken oil-stone, you may easily do so by cutting up to the shapes desired, with an old fine saw that you don't care much about. You will be astonished to find how easily a stone can be cut into small pieces.

R. Z., Boston.—The following receipts are given for making carvers' squeezing wax: (1.) Take suet, 1 part; beeswax, 2 parts. (2.) Wax, 5 parts; olive oil, 1 part. (3.) Wax, 4 parts; common turpentine, 1 part. The parts only need be melted together and allowed to cool; the wax is then fit for use. It should be well pressed into the carving. Sometimes it is only possible to take the front or

PLATE No. 56



DRAWING-ROOM FURNITURE: MORESQUE STYLE.



THE DESIDERATUM GENTLEMAN'S DRESSING-ROOM SUITE

side of an object at a time, as it must be drawn off in the form of a mold. The sections, when ready, should be filled with plaster of paris and water, made into a thick paste and allowed to set. The mold is then removed, and the plaster cast is ready to work from. In cutting molds for compo, papier-mache, candies, etc., use soft wax as they progress to regulate the depth, or a piece of bread can be worked up in the fingers until soft like dough. The bread should be fresh when it will give a good impression.

R. N., Orange, N. J.—If you wish to get the full effect of stained glass in your hall, you should not use white or plain glass. It is not generally understood how very greatly the effect of glass depends upon its abundance; or rather, upon the absence of any plain windows in its vicinity. Every single ray of light that penetrates into a room, excepting through the stained glass itself, does injury to the effect of what colored glass is there. Yes, ash will answer very well for the dado of your dining-room. It would be as well to have the tip or cap of your dado as high as the shelf of your mantel. It is better, we think, to make your overmantel of the same kind of wood as the mantel and dado is made of. Oil finish the work by all means. Get your wood-filling from some of the dealers. It will be better and cheaper than you can make it.

W. S., Lancaster, Pa.—Quarter-pitch for a house is too low. Our advice is, "Do not put a roof on any house with a lower roof than one-third pitch, if it is to be shingled. Always remember that the steeper a roof is, the longer the shingles will last, and the less liable it is to leak.

C. H. R., Fort Worth, Texas.—What you say is true. A man at forty is not too old to learn, and those mechanics under that age, who imagine they know all that is necessary in their business, soon get behind in the race. The workman that possesses brains, and who knows how to use them, will not permit himself to drop in the rear without a struggle. Workmen are plenty, but good ones possessing judgment and the proper progressive elements are scarce, but when found are worth their weight in gold. Every mechanic who desires to get along in the world, can never afford to know too much. He must reap knowledge every day.

R. T., Cleveland.—We know of no method to prevent old work cracking or chipping which has been painted white for a long series of years when dark colors are painted upon it, much will depend upon the state of the white. It is a well known fact that dark color absorbs heat, and that white repels it, and when a dark absorbent color is put upon white the tendency is always towards cracking and blistering, this is especially the case upon window shutters and linings, and all surfaces exposed to the rays of the sun, or direct artificial heat. We have frequently had to deal with cases of this kind in our experience, and we have found that the cause is independent of us, and if the work has been painted so many times with white lead paint the chances are all against its standing firm when a dark color is put upon it. The best plan where there is any doubt, is to strip the work, the next best plan is to grind it down with pumice stone and water so as to get rid of the hard glazed surface, when this is broken through, the probabilities are that the new paint will unite better with the old and thus avoid both cracking and chipping. Another plan is to break the hard surface by using a solution of sufficient strength to take off the upper crust of paint, and then paint again. We believe that in this hard surface all the danger lies.

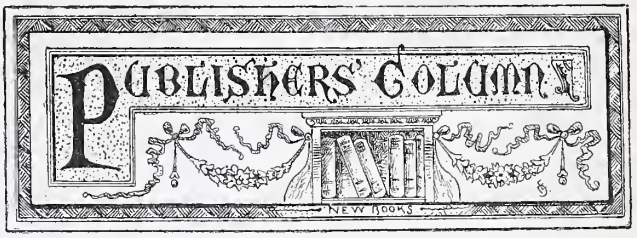
You can obtain the books inquired about, from E. & F. N. Spon, 44 Murray street, N. Y., or from this office.

"New Hand," in the May number asks for some information regarding plaster and mortar. The following, which has been taken from "Moore's Universal Assistant," has been sent to this office by a subscriber, in response to "New Hand's" request. It contains 22 different receipts for making mortar, cements, washes, &c., &c., some of which are excellent: 1. Stone Mortar.—Cement, 8 parts; lime, 3 parts; sand, 31 parts. 2. Mortar.—Lime, 1 part; sharp, clean sand, 2½ parts. An excess of water in slaking the lime swells the mortar, which remains light and porous, or shrinks in drying: an excess of sand destroys the cohesive properties of the mass. 3. Brown Mortar.—Lime, 1 part; sand, 2 parts, and a small quantity of hair. 4. Brick Mortar.—Cement, 3 parts; lime, 3 parts; sand, 27 parts. Lime and sand, and cement and sand, lessen about ¼, in volume when mixed together. 5. Turkish Mortar.—Powdered brick and tiles, 1 part; fine sifted lime, 2 parts; mix to a proper consistency with water, and lay on layers of 5 or 6 inches thick between the course of brick or stone. Very useful on massive or very solid buildings. 6. Interior Plastering—Coarse Stuff.—Common lime mortar as made for brick masonry, with a small quantity of hair; or by volumes, lime paste (30 lbs. lime,) 1 part; sand, 2 to 2¼ parts; hair, 1-6 part. When full time for hardening cannot be allowed, substitute from 15 to 20 per cent. of the lime by an equal portion of hydraulic cement. For the second or brown coat the proportion of hair may be slightly diminished. 7. Fine Stuff.—(Lime putty): Lump lime slaked to a paste with a moderate volume of water, and afterwards diluted to the consistency of cream, and then harden by evaporation to the required consistency for working. In this state it is used as a slipped coat, and when mixed with sand or plaster of paris, it is used for the finishing coat. 8. Gauge Stuff or Hard Finish is composed of 3 or 4 volumes of fine stuff and 1 volume of plaster of paris, in proportions regulated by the degree of rapidity required in hardening for cornices, etc., the proportions are equal volumes of each, fine stuff and plaster. 9. Stucco is composed of from 3 to 4 volumes of white sand to 1 volume of fine stuff or lime putty. 10. Scratch Coat.—The first of 3 coats when laid upon laths, and is from ¼ to ¾ of an inch in thickness. 11. One Coat Work.—Plastering in 1 coat without finish, either on masonry or laths that is rendered or laid. Work on well. 12. Two Coat Work.—Plastering in 2 coats is done either in a laying coat and set or in a screed coat and set. The screed coat is also termed a floated coat. Laying the first coat in two coat work is resorted to in common work instead of screeding, when the finished surface is not required to be exact to a straight edge. It is laid in a coat of about ⅛ inch in thickness. The laying coat, except for very common work, should be hand floated, as the tenacity and firmness of the work is much increased thereby. Screeds are strips of mortar, 26 to 28 inches in width, and of the required thickness of the first coat, applied to the angles of a room or edge of a wall and parallelly, at intervals of 3 to 5 feet over the surface to be covered. When these have become sufficiently hard to withstand the pressure of a straight edge, the interspaces between the screeds should be filled out flush with them, so as to produce a continuous and straight, even surface. Slipped Coat is the smoothing off of a brown coat with a small quantity of lime putty, mixed with three per cent. of white sand so as to make a comparatively even surface. This finish answers when the surface is to be finished in distemper or paper. Hard Finish: Fine stuff applied with a trowel to the depth of about ⅛ of an inch. 13. Cement for External Use.—Ashes, 2 parts; clay, 3 parts; sand, 1 part; mix with a little oil. Very durable. 14. Compositions for Streets and Roads.—Bitumen, 16.875 parts; asphaltum, 2.25 parts; oil of resin, 6.25; sand, 1.35 parts. Thickness from 1½ to 1¾ inches. Asphaltum, 55 lbs., and gravel 28.7 lbs. will cover an area of 10.75 square feet. 15. Asphalt Composition.—Mineral pitch, 1 part; bitumen, 11 parts; powdered stone or wood ashes, 7 parts. 16. Asphalt Mastic is composed of nearly pure carbonate of lime and about 9 or 10 per cent. of bitumen. When in a state of powder it is mixed with about 7 per cent. of bitumen in mineral pitch. The powdered asphalt is mixed with the bitumen in a melted state along with clean gravel, and consistency is given to pour it into molds. The asphalt is ductile, and has elasticity to enable it, with the small stones sifted upon it, to resist ordinary wear. Sun and rain do not affect it, wear and tear do not seem to injure it. The pedestrian in many cities in the United States and Canada, can readily detect its presence on the sidewalk by its peculiar yielding to the foot as he steps over it. It is also a most excellent roofing material when rightly applied, it being on record in France that a stout roof of this material withstood the accidental fall of a stack of chimneys, with the only effect of bruising the mastic, readily repaired. 17. Asphalt for Walks.—Take 2 parts very dry lime rubbish, and 1 part coal ashes, also very dry, all sifted fine. In a dry place, on a dry day, mix them, and leave a hole in the middle of the heap, as bricklayers do when making mortar. Into this pour boiling hot coal tar; mix, and when as stiff as mortar, put it three inches thick where the walk is to be; the ground should be dry and beaten smooth; sprinkle over it coarse sand. When cold, pass a light roller over it; in a few days the walk will be solid and water-proof. 18. Mastic Cement for Covering the Fronts of Houses.—Fifty parts, by measure, of clean dry sand, 50 of limestone (not burned) reduced to grains like sand, or marble dust, and 10 parts of red lead, mixed with as much boiled linseed oil as will make it slightly moist. The bricks to receive it, should be covered with three coats of boiled oil, laid on with a brush, and suffered to dry before the mastic is put on. It is laid on with a trowel like plaster, but it is not so moist. It becomes hard as stone in a few months. Care must be exercised not to use too much oil. 19. Cement for Tile-Roofs.—Equal parts of whiting and dry sand, and 25 per cent. of litharge, made into the consistency of putty with linseed oil. It is not liable to crack when cold, nor melt, like coal-tar and asphalt, with the heat of the sun. 20. Cement for Outside of Brick Walls.—Cement for the outside of brick walls, to imitate stone, is made of clean sand, 90 parts; litharge, 5 parts; plaster of paris, 5 parts; moistened with boiled linseed oil. The bricks should receive two or three coats of oil before the cement is applied. 21. Water Lime at Fifty Cents per Barrel.—Fine clean sand, 100 lbs.; quick-lime in powder, 28 lbs.; bone ashes, 14 lbs.; for use, beat up with water, and use as quick as possible. 22. Cement for Seams in Roofs.—Take equal quantities of white lead and white sand, and as much oil as will make it into the consistence of putty. It will in a few weeks become as hard as stone.

A correspondent writing from Omaha, Neb., says that a very handsome hotel is being erected at a cost of $200,000 by the Kitchen Bros., of that city. The building will contain about 200 rooms and will be equipped with all modern appliances and conveniences. The work is under the personal supervision of Mr. Sidney Smith, of Omaha.

R. J.—The drawings of a building belong to the architect. You have no more right to them than you have to the tools the carpenter used in hanging your doors or fitting your sashes. Drawings are part and parcel of the architect's outfit—his tools in fact—and they are only *loaned* to the proprietor during the progress of the erection of his building. Sometimes it is stipulated that the drawings shall become the property of the owner of the building when the latter is finished. This is a matter, however, of private agreement.

R. P. S., Williamsport, Pa.—Write to N. & G. Taylor Co., Philadelphia, Pa., for one of their circulars. It gives all the information you ask for regarding their "old style" brand roofing tin plate.



☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

For our clubbing rates see page X, advertising columns in last November's BUILDER AND WOOD-WORKER.

Any person having a complete set of "Knight's Mechanical Dictionary," and desiring to exchange it for Architectural books, or sell it cheap, may find a purchaser by addressing this office.

Bound volumes of the B. & W. W. for 1881, sent from this office to any address in the United States or Canada, on the receipt of $2.50. The volume contains the following full page, fine lithographed designs:

A Country Cottage—A Proposed Residence—Amateur's Washstand—A Parsonage—Army Billiard Table—A Method of Drainage—Angles for Wood-cutters, &c—Amateur's Mantel—Amateur's Designs—Am. "Amateur" Sheet of Designs—Book-case and Problems—Bric-a-Brac Case for Bay Window—Book-case for Builder and Wood-worker—Bed, with Details—Bay Window—Book-case and Mantel—Bed and Dressing Case—Book-case and Bracket—Cornice, Capital and Cabinet—Cherry Mantel for Parlor—Cottage at Spring Lake, N. J.—Cottage and Plans—Cabinet Book-case Design—Corner Cabinet—Design for a Cottage—Design for a Mantel—Desk and Cabinet—Design for an Organ Case—Dining-room Wantel—Design of Parlor Cabinet—Design of Lamp and Pedestal—Design for a Public Library—Design for a Flower Stand—Designs for Mantels (3)—Design for a Rectory—Design for a House (2)—Design for a Monument—Design for a Bed-room Suite—Design for a House House and Public Hall—Design for a Court-house and Jail—Design and Details for Hanging Cabinet—Design of "Art Furniture" (10)—Design for a Mantel—Design for Scroll Sawyers—Design for a Stable—Design for a Doorway—Design for Hall Staircase—Easels and Cabinets—Elevation and Plans of Cottage—Elevation and Plans of Commonsense Cottage—Elevation of Cottage—Elevations of Cottages—Elevation of Cottage—Elevations and Plan of Cottage—Elevations of a Drawing Table—Elevations of Cottage—Elevations of Cottage—Flower Stand—Front and End Elevation of a Store—Hat Rack with Details—Hall Interior for Country Hotel—House, By S. N. Small—Hand-Rail Problems—Interior Section of Frame Church—Japanese Cabinet—Letters and Monograms—Lounge Design—Library Chair—Library Table and Bungalow—Mantel and Cabinet—Miscellaneous Designs, Plate 16, 20, 28—Mechanics of Architecture—Mantel for Billiard Room—News Stand—New Style Coal-bins—New Designs for Turners—Oriental Turned Work—Perspective and Plan of a Church—Plans and Elevations of an Apartment House—Queen Anne Cottage—Screen and Fireplace for Office—Store Front—Seaside Cottage—School-house, Wheeling, W. Va.—Studies for Amateurs—Stairway in Hall—Steel Square Problems—Suite of Chamber Furniture—Two Elevations of Cottage—Two Cabinets—Two Designs for Mantels—Tool Chest—Village Barn—Ventilation of Sewers—Wall Paper Design—Working Drawings of Umbrella Stand—Wall Bracket—Walcot Memorial Church, at Walcot, N. Y.

Besides the foregoing full page illustrations, the Volume contains a number of "cuts" of cabinets, scroll-work, machines, appliances, and other things; and about 150 pages of text, including tables, rules, and memoranda for builders, carpenters, cabinet-makers and others. The Volumes are bound in cloth—"stiff covers"—with gold title on back.

Otis Bros. & Co., are busily engaged in manufacturing safety steam and hydraulic elevators. Their factory at Yonkers, comprises a large and commodious building, which is filled with a good quality of machinery. They have also added within a few months a large quantity of new tools, and are now turning out some very large hydraulic elevators for parties in New York, and other parts of the country. This concern have largely increased their capacity during the past year, and they now employ about 200 men.

The firm of E. T. Barnum's wire and iron works, Detroit, Mich., is turning out some fine examples of roof crestings, finials, and other ornamental iron work. The stable furniture, hay racks, iron fences, iron stairs, shutters, bedsteads, &c., &c., are known all over the Western and Middle States, for their artistic finish, durability, and honesty of workmanship. The recent increase of trade has caused the firm to add some new designs to their products, and they now turn out work in the most modern styles, and equal in quality to any made in the country.

Those mechanics who have used the "Saw file Guide," manufactured by E. Roth & Bro., New Oxford, Pa., are well aware of its efficiency and satisfactory working, and will be agreeably surprised to hear that the makers have so improved the machine that it is now simply perfect in operation and results.

"WHAT is home without a mother?" Well, indeed, a home without a mother is not, generally speaking, the most joyful spot on earth; still, if the home is provided with one of Lesley's Zero Refrigerators, and something eatable to put in it to keep cool until wanted, life may be made tolerably pleasant. But the home where both mother and refrigerator may be found is, without doubt, the only paradise that exists on earth. The mother, by her affection, self-denial, and angelic qualities, allays all mental storms and morally purifies the intellectual atmosphere, and thus tends to impart intellectual and moral strength. The refrigerator perform for the physical part of the household what the mother does for the mental. It tends to give sweetness to the every-day meals, and cools the daily beverages and makes them acceptable to the stomach, and thus aids to give health, tone, and vigor to the body.

"Throw physic to the dogs" and buy a Zero Refrigerator from Alex. Lesley, 1337 Broadway, New York.

The Amesbury Band Saw Filing, and Band Saw Setting Machines.

USERS of band saws know how troublesome it is to keep their saws in good working order, and how difficult it is to get them right when once, by either careless filing, accident, or unskillful setting they get in bad shape. For many years, the want of some machine or device by which these saws could be put in good order rapidly and efficiently, was felt by those having charge of them. The want need be no longer felt, as the Amesbury machines meet the requirements fully and satisfactorily both as to rapidity and efficieney.

Band saws contain from 500 to 1,800 teeth, and to file them by hand takes an expert from one-half to one and a half hours, and when this operation has to be performed several times a day, which is the case where a saw is constantly in use, this condition of things, it will be seen at once, entails considerable expense, and the results are not always satisfactory. The Amesbury filing machine, which is illustrated in the accompanying engraving, Fig. 1, is warranted to file a saw more accurately, in from five to ten minutes, than the most expert filer could do it in an hour by hand; and the cost of the files would not be any more. The machine is designed to set on an ordinary bench, as seen in the engraving, and the saw blade may either be suspended from a simple yoke above

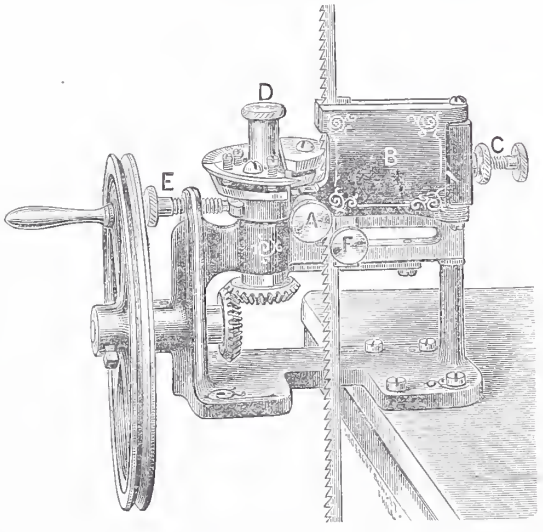


FIG. 1.—BAND SAW FILING MACHINE.

the machine, or may be left in place on the band sawing machine. The filing machine is provided with a feeding mechanism that can be adjusted to suit any size of teeth, and is so arranged that it will feed only the tooth that is to be filed.

The mechanical construction of the machine will be understood from the following: The file-head is composed of two sections, one stationary and the other movable in the direction of its axis. The stationary section carries the feeder and a very thin segmental file, which is intended to file only the face and throat of a tooth. The movable section carries a thick beveled file, suitable for the different grades of teeth, and rotates on a higher plane and files the back of the tooth which has previously been filed on its face by the thin file, and at the same time cleans off the bur on the point of the tooth. This file is adjustable up or down by a thumb-screw D, to suit the grade of teeth, or to give any desired pressure upon the back of the same. The object of this construction is to divide the labor of the files and to relieve the blade and machine from the strain occasioned by filing all parts of a tooth at one time, and at the same time to get all possible wear out of the files.

The construction of the ordinary three cornered file used for saws is well known; the corners being the most delicate part, are the first to wear away, and although the body of the file is still good, the corners being gone, is of no further use. The plan adopted in this machine is to provide a light, cheap file, cut only on its face and corner, for sharpening the face of the teeth and gumming out the throat, and to alternate with a thick beveled file which sharpens only the back of the tooth. Thus is secured the entire wear of the more expensive file, which will outwear two or three of the cheap corner files, and can be renewed at a low cost.

The head carrying the files runs in an oblong bearing which permits it to vibrate to and from the saw, to compensate for high teeth or any other irregularity, and is provided with a pressure spring in the thimble E, which can be adjusted to give any desired pressure against the teeth. It is also provided with a spring under the head, which gives it an upward pressure against the face of the tooth. Thus, it will be seen, that the high teeth, receiving the most pressure, will soon be filed to a level with the lower ones, and no trouble will be experienced in keeping them uniform. The saw is held in a clamping jaw with the back resting against the gauge F, which is readily adjusted to any width of saw by the screw C, and can be set at any angle. The clamping jaw is operated by a cam on the hub of the gear, and opens and closes as the machine is feeding or filing. This jaw acts like a vise upon the saw when the files are in contact with the teeth, and immediately releases it when in contact with the feeder.

From the foregoing description, and an inspection of the cut, our mechanical readers will readily comprehend the action of this machine. It is characterized by great simplicity; it is strongly constructed, and is affirmed to be very durable; it can be readily adjusted to its work. The files are made of the best mill steel, and they can be replaced at a cost corresponding to that of an ordinary saw file. The machines are made to take band saws from one-16th inch to 2 inches, and from the finest tooth to two teeth to the inch.

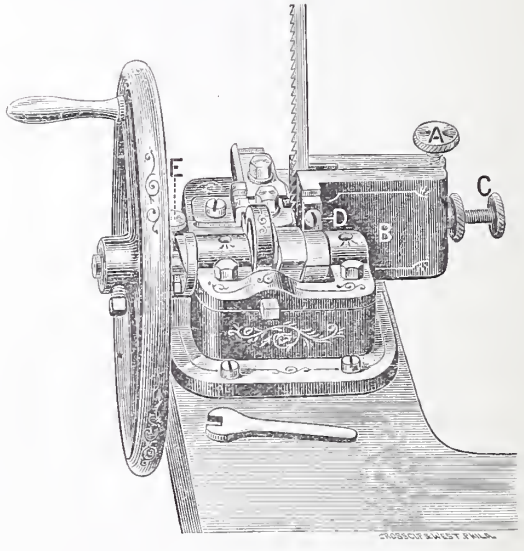


FIG. 2.—BAND SAW SETTING MACHINE.

The band saw setting machine, designed by the same person, is a machine equally useful and convenient in its way to the makers and users of band saws as the machine above described. It is shown in Fig. 2. It is designed and constructed upon entirely new principles, and embodies all the good features of hand work in combination with the speed and regularity of machine work. The users of band saws have long felt the want of a machine that would hold a narrow saw in a rigid position and set the teeth without straining the blade and that will set the teeth of any band saw without in any manner affecting the blade. It is arranged to work by an easy, uniform crank motion, and when the tooth to be set is fed into position, the blade is firmly locked between the steel jaws of a vise, and remains immovable while the tooth is set to any degree required. As the crank goes forward, the blade is released, when the next tooth is fed up to the dies, the blade again locked in vise, and this tooth set in the opposite direction. All these movements are automatic, and can be carried on at a speed of 300 teeth per minute. The feeder picks up *only the tooth that is to be set*, consequently each tooth is fed to its proper position, *regardless of their irregularity*. No further expense is required outside of the machine, as the band saw is simply hung up over the machine on a wooden bracket, and the lower part left pendant near the floor.

Wherever these machines have been tried they have universally given satisfaction. Both these machines are manufactured by the firm of Goodell & Waters, Thirty-first and Chestnut streets, Philadelphia, to whom all inquiries and orders should be sent.

THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

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N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

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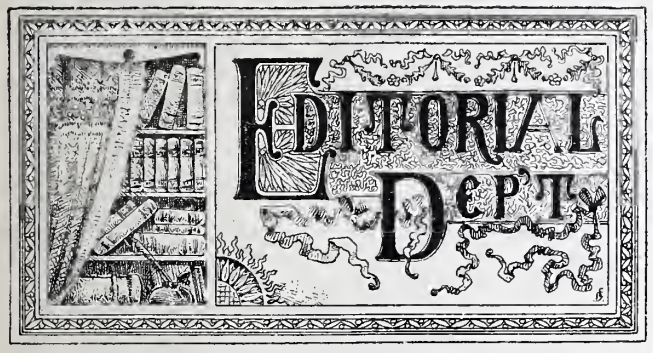


AS we are determined to push the BUILDER AND WOOD-WORKER into every nook and corner in these great United States and Canada, during the ensuing summer and fall, and have determined to make extraordinary arrangements with agents who are willing to take hold of the paper and *push* it, for the next sixty days we will give such commissions for new yearly subscribers that enterprising young fellows will be able to make from 6 to 10 dollars a day with very little effort. We offer a good paper for a very low price, and everybody who is engaged in any of the pursuits it represents takes it at sight. And so they may, for there is no journal published in the whole world that gives so much for so small a price as the BUILDER AND WOOD-WORKER is sold for. Write to us for information regarding our terms, and we are sure you will be satisfied.

LONDON builders, like London merchants, keep their manufactured goods in stock. Houses, of nearly every grade, are built, finished and completed in every particular, and are held for years. This gives an opportunity to people who want houses for choosing such a building as may suit their requirements, and at the same time enables them to occupy their own house at once. This system also has other advantages; it does away with the necessity of hasty and imperfect building, and lessens the risks and inconveniences that are sure to follow the occupancy of a newly finished dwelling. It is not likely that builders will use unseasoned materials in houses that have to remain on their hands for several years before selling—it wouldn't pay. Of course only wealthy builders who can afford to wait for results carry on a business of this kind, but they get their reward, inasmuch as needy builders cannot compete with them on this line. This system also tends to crush out "jerry building" as the buildings referred to must necessarily be well constructed, or the continual inspection to which they are subjected by intending purchasers would soon bring to light their imperfections, and thus give the houses such repute as would seriously depreciate the price set on them.

THE Egyptians are supposed to have been the earliest people amongst whom the art of cabinet making was brought to any stage of excellence. The scarcity of authentic specimens of the furniture of ancient Egypt may be attributed to the fact that most of it was made of wood, and has consequently succumbed to the depredations of the many centuries which have elapsed since that country enjoyed its prosperity. It must be remembered that when we speak of ancient Egypt we are referring back some two or three thousand years, and considering their best productions, we may well marvel at the comparatively small amount of progress which has been made during that period. At the time of Joseph (that is to say, about 3,300 years ago) the art of chair-making was brought to such perfection that chairs were elaborately decorated, made without any under-framing, and the exquisite patterns of the luxurious coverings of the fauteuils, &c., are even pirated at the present day. The reception-room of the ancient Egyptian was generally better furnished than any other apartment in the house, and it was here he was required to show his taste in the decoration and distribution of those articles which constituted the furniture of the room. The walls, which were generally of stucco, were ornamented with decorations executed in flat tints, without any attempt at shadow or shade, and always treated in a conventional manner. The ceilings were decorated after the same manner as the sides of the room, or perhaps more elaborately, the pattern being sometimes set and divided into parts, after the manner subsequently adopted by the Greeks. Amongst the usual furniture of their apartments were couches, ottomans, fauteuils, chairs, footstools, tables, &c., whilst mats or skins covered the floors. The paintings upon the ancient papyrus leaves, which are preserved in the British Museum, give a very concise idea of the furniture and fittings of the interiors of an Egyptian house.

IN 1872, the municipality of Paris established a free public apprenticeship school for the education of workers in wood and iron, which has been so successful that $400,000 has been recently voted for the establishment of similar schools in various parts of the city. The course of study covers three years, and the instruction is divided into general and technical. The general course includes the elements of mathematics, physics, mechanics and chemistry in their relation to industry, also explanations concerning the tools, the materials, the processes and the products presented by the range of practice of the workshops. During the summer visits are paid to in-

dustrial establishments, of which the scholars give an account in writing.

The trade instruction in the workshops is subdivided into two courses. In the first the pupils are taught the nature and condition of materials. In the second they pass to actual construction. During the first two years six hours daily are spent in the workshop and four in the school. In the third year eight hours are spent in the workshop and two in the school.

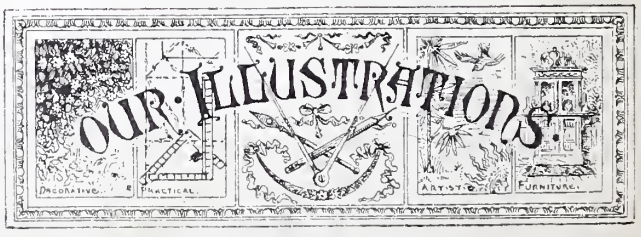
M. Tolain, president of the commission having the subject under consideration, in his report says: "In consequence of the virtual abolition of apprenticeship in most trades, and owing to the specialization and subdivision of manufactures recently from the introduction of machinery, the number of skillful and intelligent workmen in all branches of industry and art manufactures has decreased, and the standard of technical knowledge has been lowered." This he considers has been especially prejudicial to French manufactures, the distinguishing merit of which he believes to have consisted in originality of design. He believes that a remedy for these evils will be found in the establishment of apprenticeship schools, the object of which should be mainly, not the creation of foremen, but the theoretical and practical education of workmen proper. Among the schools to be founded is one for the furniture trades, to form workers in wood, who would become chiefly cabinetmakers and upholsterers, but also carpenters, joiners, and wood-carvers; and workers in iron intending to become general smiths and workers in metal for the same trade, and for decorative purposes.

We are thoroughly of the opinion that a school of this kind should pertain much more of the workshop than of the school, and that the teachers who are brought in direct contact with the pupils should be mechanics who have, for several years at least, earned their daily bread at the bench or forge. Kid-gloved teachers will always fail, when teaching the hard matter-of-fact operations.

THE New York *Herald* is noted for its fairness—from its point of view—when discussing matters in connection with strikes and labor movements. Indeed, during the present struggle between labor and capital, the *Herald* has thrown its great influence in favor of the industrial classes, because it has recognized their rights in the contest. Sometimes, however, even the *Herald* gets on the wrong scent and arrives at conclusions that facts do not justify. The following, which is taken from a recent issue, contains several statements that are misleading, simply because they have strayed from the facts:

"Able carpenters and masons, such as the rural districts are full of, are almost unknown in New York. In one branch of the art of building there are men who can lay beams, others who can nail down flooring and a few who can do joiner work; in the other there are men who lay walls, some who put on lath and others who can spread plaster; but a competent carpenter or mason can hardly be found except among men who come from the country. The result is the worst lot of houses, for the money expended, that can be found in the United States. If co-operation is possible in America now is the golden time for a few able country builders, who have a little money to combine, to come to New York and put up houses that will not disgrace the entire guild of builders. Although wages in New York are no higher than at many small places in the interior there is no place east of the Rocky Mountains where houses are as badly built and at the same time cost as much as here, and incompetent workmen are the principal cause of the difference. Let the country builder come in and shame our city bunglers either into learning their business properly, or into retiring to some trade more befitting their lack of skill and character."

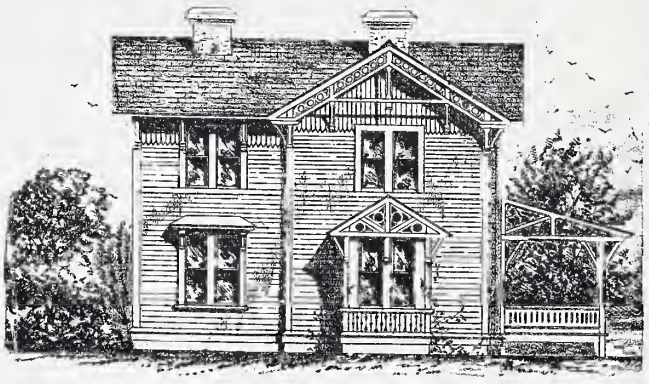
WITH regard to the foregoing extract, it is safe to say that some one has got the ear of the *Herald*, that hasn't scrupled to offer statements at variance with truth. That many good, steady carpenters and joiners come from the rural districts, is a fact, which leads us to mention the other fact that at least two-thirds of the botchers, wood butchers and mud spreaders that we find in cities, also come from the rural districts. That a "competent carpenter and mason can hardly be found except among men who come from the country," is simply absurd on the face of it. The city mechanic, one who has grown up in his trade, in the city, sees more of the true methods of working in one month than a country workman does in five years. Practical men know that work good enough to be acceptable in a country town, would, in nine cases out of ten, be condemned in a city. Country workmen coming to New York have to unlearn a great deal they have been taught, to learn many things they never heard of. That many houses are badly constructed in this city, is true, and is a standing disgrace to the builders; but the cause of this bad construction is not for lack of good mechanics; but because of parsimony on the part of owners, cupidity of contractors and laxity of superintendence. No one can slight work with as much ease as the finished workman, and we have known of instances where the best working talent and skill was employed to cheapen work, at the expense of solidity and durability, so that the difference might go into the pockets of the contractor. There are very few mechanics that do not take a loving interest in their work, and who would faithfully perform their parts if they were allowed; but every man nowadays must work up at high-pressure speed, and the employer seldom asks him how good the work is done, but how much of it is performed in a given time. The workman is in a measure dependent on his employer; and it is to satisfy him that quantity is made to usurp the place of quality. It is true that there are a great many bungling mechanics in New York, but there are no more in proportion than there are in other cities. This is not owing, however, to trade unionism, but rather from lack of a good old-fashioned apprentice system, and from a tendency of employers to engage cheap men to perform work requiring skill and higher remuneration. If the *Herald* wants any good work done for its owners, and is willing to pay for it, THE BUILDER AND WOOD-WORKER will undertake to find a dozen times more men in the city of New York, capable of doing it as well and as cheaply as it can be executed for by workmen from any part of the round world. Let the *Herald* turn its guns on the employers of labor of this sort, and those who have superintendence over it, and show them how they may get good work done; this will be much better than advising country workmen to come to this city, to find when they get here they are only novices in the building arts. Many a mechanic who in his country home was noted for his skill and good taste, finds his face tingle with shame at his ignorance when he enters the lists with city workmen.



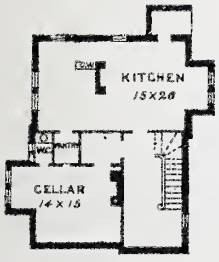
ON Plate 57 we show two designs with floor plans, for cheap cottages, suitable for village or country. Both houses are inexpensive and neat. The one shown on the top of the plate is a very convenient house, and would answer the requirements of many well-to-do

PLATE No. 57

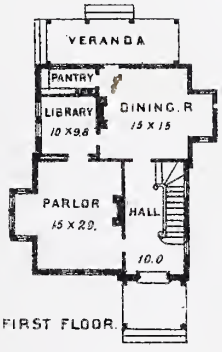
FRONT ELEVATIOIN



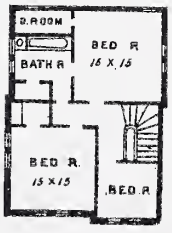
SIDE ELEVATION.



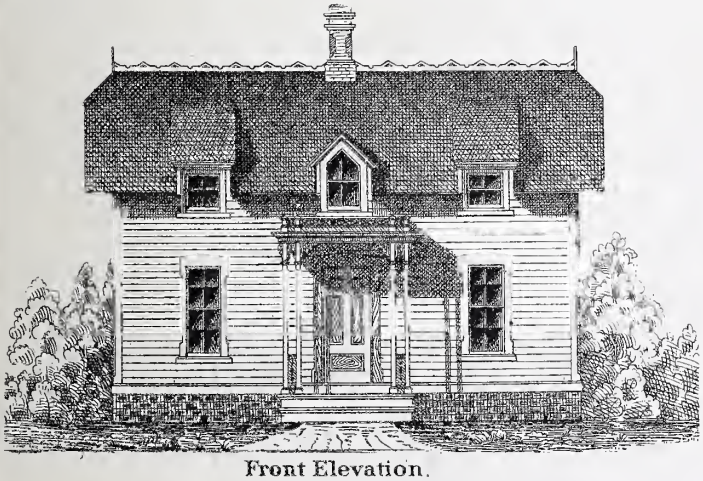
BASEMENT



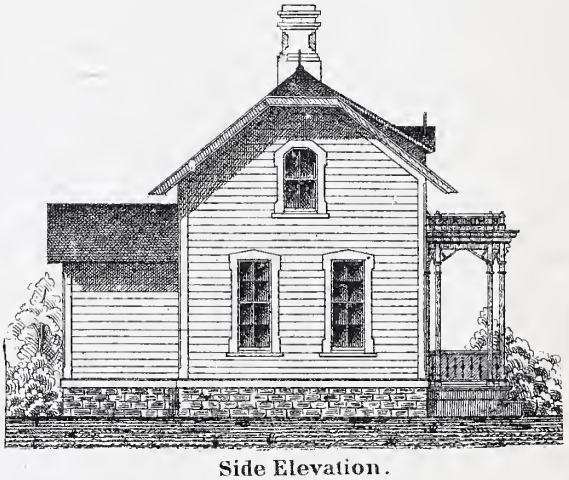
FIRST FLOOR.



SECOND FLOOR

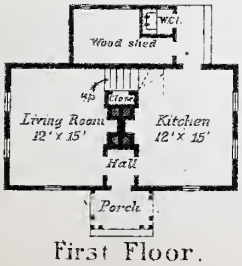


Front Elevation.

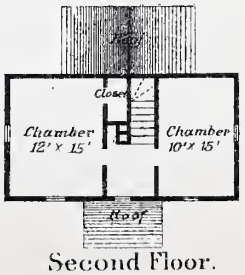


Side Elevation.

Village and Country Houses.



First Floor.



Second Floor.

mechanics. The cost of such a house, in the central or western States, would be about $1,400. Of course, a great deal would depend on the way in which it was finished inside. It could be built for less, and could easily cost $600 more.

The cottage shown on the lower part of the plate, should be built for $800. It would made a comfortable home for a person of small means, and whose family consisted of only two or three persons.

Plate 58 shows alternative designs for a town house. The drawing is from the office of S. M. Howard, Wheeling, W. Va.

Plates 59 and 60 show competitive sketches for a building designed for the Y. M. C. A., of Newburgh, N. Y.

The sketches are by Rossiter & Wright, architects, 149 Broadway, New York City.

Plates 61 and 62 show some samples of dining-room furniture taken from a work (Fashionable Furniture) recently published by J. O. Kane, of this city, and to which we refer in our book reviews in the present issue.

On Plate 63 we exhibit a design for a mantel, which for originality, oddity and variety, exceeds anything we have seen for some time. The design contains a number of suggestions and combinations which some of our artists, who love novelties, will, no doubt, appreciate.

The design is the work of E. G. N. Dietrich, of Pittsburgh, Penn.

We have frequently been asked to publish a series of articles on Stair Building and Hand Railing, and in several instances have been asked to publish Jones' system, or the system taught by Mr. Mayer, and published in the *Carpenter and Joiner's Assistant*. In compliance with these requests, we have decided to republish the papers and illustrations by Mayer, and Plate 64 is published with this object. Further explanation will be found in another column.

The Stability of the Arch.

BY F. E. KIDDER, B. C. E.

THE arch is an arrangement for spanning large openings by means of small blocks of stone or other material, arranged in a certain way. As a rule the arch answers the same purpose as the beam, but it is widely different in its action, and in the effect that it has upon the appearance of an edifice. A beam exerts merely a vertical force upon its supports, but the arch exerts both a vertical load and an outward thrust. It is this thrust which requires that the arch should be used with caution where the abutments are not abundantly large.

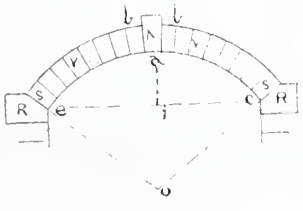


Fig. 1.

Before taking up the principles of the arch it may be well to define the many terms relating to the arch. The distance, *c c*, Fig. 1, is called the *span* of the arch, *a i* its *rise*, *b* its *crown*; its lower boundary line, *e a c*, its *soffit*, or *intrados*; the outer boundary line its *back*, or *extrados*. The terms soffit and back are also applied to the entire lower and upper curved *surfaces* of the whole arch. The ends of the arch, or the sides which are seen, are called its *faces*. The blocks of which the arch itself is composed are called *voussoirs*; the center one, *k*, is called the *keystone*, and the lowest ones, *s s*, the *springers*. In *segmental* arches, or those whose intrados is not a complete semicircle, the springers generally rest upon two stones, as R R, which have their upper surface cut to receive them; these stones are called *skewbacks*. The line connecting the lower edges of the springers is called the *springing line*; the sides of the arch are called the *haunches*, and the load in the triangular space, between the haunches and a horizontal line drawn from the crown, is called the *spandrel*.

The blocks of masonry, or other material, which support two successive arches, are called *piers*; the extreme blocks, which in the case of stone bridges generally support on one side embankments of earth, are called *abutments*.

A pier strong enough to withstand the thrust of either arch, should the other fall down, is sometimes called an *abutment pier*. Besides their own weight, arches usually support a permanent load or surcharge of masonry or of earth.

In using arches in architectural constructions, the form of arch is generally governed by the style of the edifice, or by a limited amount of space. The semicircular and segmental forms of arches are the best as regards stability, and are the simplest to construct. Elliptical and three-centered arches are not as strong as circular arches, and should only be used where they can be given all the strength desirable.

The strength of an arch depends very much upon the care with which it is built and the quality of the work.

In stone arches, special care should be taken to cut and lay the beds of the stones accurately, and to make the bed-joints thin and close, in order that the arch may be strained as little as possible in settling.

To insure this, arches are sometimes built dry, *grout* or liquid mortar being afterwards run into the joints; but the advantage of this method is doubtful.

Brick arches may be built either of wedge-shaped bricks, moulded or rubbed so as to fit to the radius of the soffit, or of bricks of common shape. The former method is undoubtedly the best, as it enables the bricks to be thoroughly bonded as in a wall; but as it involves considerable expense to make the bricks of the proper shape, this method is very seldom employed. Where bricks of the ordinary shape are used, they are accommodated to the curved figure of the arch by making the bed-joints thinner towards the intrados than towards the extrados, or if the curvature is sharp, by driving thin pieces of slate into the outer edges of those joints; and different methods are followed for bonding them. The most common way is to build the arch in concentric rings, each half a brick thick: that is, to lay the bricks all stretchers, and to depend upon the tenacity of the mortar or cement for the connection of the several rings. This method is deficient in strength, unless the bricks are laid in cement at least as tenacious as themselves. Another way is to introduce courses of headers at intervals, so as to connect pairs of half-brick rings together.

This may be done either by thickening the joints of the outer of a pair of half-brick rings with pieces of slate, so that there shall be the same number of courses of stretchers in each ring between two courses of headers; or by placing the courses of headers at such distances apart that between each pair of them there shall be one course of stretchers more in the outer than in the inner ring.

Fig. 2.

The former method is best suited to arches of long radius, the latter to those of short radius. *Hoop iron* laid round the arch, between half-brick rings, as well as longitudinally and radially, is very useful for strengthening brick arches. The bands of hoop iron which traverse the arch radially may also be bent, and prolonged in the bed joints of the backing and spandrels.

By the aid of hoop-iron bond Sir Marc-Isambard Brunel built a half-arch of bricks laid in strong cement, which stood projecting from its abutment like a bracket, to the distance of 60 feet, until it was destroyed by its foundation being undermined.

The New York City Building Laws make the following requirements regarding brick arches:

"All arches shall be at least four inches thick. Arches over four feet span shall be increased in thickness toward the haunches by additions of four inches in thickness of brick; the first additional thickness shall commence at two and a half feet from the center of the span, the second addition at six and one-half feet from the center of the span, and the thickness shall be increased thence four inches for every additional four feet of span towards the haunches.

"The said brick arches shall be laid to a line on the centers with a close joint, and the bricks shall be well wet, and the joints filled with cement mortar, in proportions of not more than two of sand to one of cement, by measure. The arches shall be well grout d and pinned or chinked with slate and keyed."

Rule for Radius of Brick Arches.—A good rule for the radius of segmental brick arches over windows, doors, and other small openings is to *make the radius equal to the width of the opening*. This

gives a good rise to the arch, and makes a pleasing proportion to the eye.

It is often desirable to span openings in a wall by means of an arch, when there is not sufficient abutments to withstand the thrust, or kick, of the arch. In such a case the arch can be formed on two cast iron skewbacks, which are held in place by iron rods, as is shown in fig. 2.

In such a case it is necessary to proportion the size of the rods to the thrust of the arch. The horizontal thrust of the arch is very uearly represented by the following formula :

$$\text{Hor. thrust} = \frac{\text{load on arch} \times \text{span}}{8 \times \text{rise of arch in feet}}$$

If two tension rods are used, as is generally the case, the diameter of each rod can be determined by the following rule :

$$\text{Diameter in inches} = \frac{\sqrt{\text{total load on arch} \times \text{span}}}{16 \times \text{rise of arch in feet} \times 7854}$$

If only one rod is used, 8 should be substituted in the place of 16, in the numerator of the above rule, and if three rods are used, 24 should be used instead of 16.

CENTERS FOR ARCHES.

A center is a temporary structure, generally of timber, by which the voussoirs of an arch are supported while the arch is being built. It consists of parallel frames or ribs, placed at convenient distances apart, curved on the outside to a figure parallel to that of the soffit of the arch, and supporting a series of transverse planks, upon which the arch stones rest.

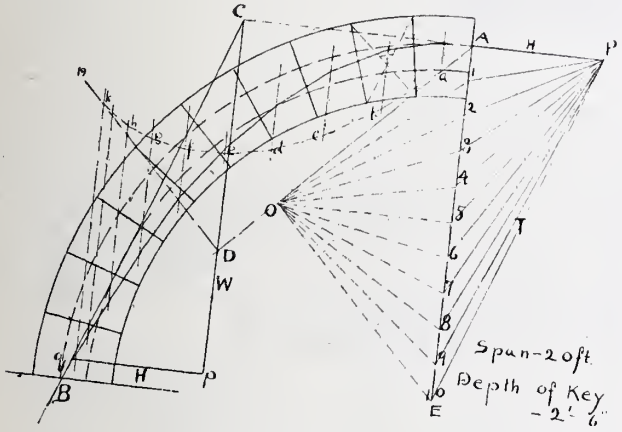


Fig. 3.

The most common kind of center is one which can be lowered or struck all in one piece, by driving out wedges from below it, so as to remove the support from every point of the arch at once.

The center of an arch should not be struck until the solid part of the backing has been built, and the mortar has had time to set and harden; and when an arch forms one of a series of arches, with piers between them, no center should be struck, so as to leave a pier with an arch abutting against one side of it only, unless the pier has sufficient stability to act as an abutment.

When possible the center of a large brick arch should not be struck for two or three months after the arch is built.

MECHANICAL PRINCIPLES OF THE ARCH.

In designing an arch the first question to be settled is the form of the arch, and in regard to this there is generally but little choice. Where the abutments are abundantly large the segmental arch is the strongest form, but where it is desired to make the abutments of the arch as light as possible a pointed or semicircular arch should be used.

Depth of Keystone.—Having decided upon the form of the arch, the depth of the arch ring must next be decided. This is generally determined by computing the required depth of keystone and making the whole ring of the same or a little larger depth.

In considering the strength of an arch, the depth of the keystone is considered to be only the distance from the extrados to the intrados of the arch, and if the keystone projects above the arch ring, as in Figure. 1, the projection is considered as a part of the load on the arch.

There are several rules for determining the depth of the keystone, but all are empirical, and they differ so greatly that it is difficult to recommend any particular one. Prof. Rankine's rule is often quoted, and is probably true enough for most arches. It applies to both circular and eliptical arches, and is as follows :

Rankine's Rule.—For the depth of the keystone, take a mean proportional between the inside radius at the crown, and .12 of a foot for single arch, and .17 of a foot for an arch forming one of a series. Or, if represented by a formula,

$$\text{Depth of keystone for a single arch, in feet} = \sqrt{(.12 \times \text{radius at crown.})}$$

$$\text{Depth of keystone for an arch of a series, in feet} = \sqrt{(.17 \times \text{radius at crown.})}$$

This rule seems to agree very well with actual cases in arches of a certain kind. By it, however, the depth of keystone is the same for spans of any length, provided the radius is the same, and in this particular, it seems to us, the rule is not satisfactory.

Trautwine's Rule.—Mr. Trautwine, from calculations made on a large number of arches, has dedueed an original rule for the depth of keystone, which is more agreeable to theory than Rankine's.

His rule is, for *cut stone*,

$$\text{Depth of key, in feet} = \left(\frac{\sqrt{\text{rad.}} + \text{half span}}{4}\right) + .2 \text{ foot.}$$

For *second-class* work, this depth may be increased about one-eighth part, or for *brick or fair rubble* about one-fourth.

The following table gives a few examples of the depth of keystone of some existing bridges, together with the depth which would be required by Trautwine's or Rankine's rule. From this table it will be seen that both rules agree very well with practice.

TABLE I.

Showing depth of Keystone of some existing arches.

BRIDGE—(Circular arc.)	Span.	Rise.	Radius.	Actual depth of key.	Calculated depth of key.		Engineer.
					Trautwine's Rule.	Rankine's Rule.	
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	
Cabin John, Washington Aqueduct	220	57.25	134.25	4.6	4.11	4.0	Meigs.
Grosvenor Bridge, Chester, Eng....	200	42	140	4	4 07	4.1	Hartley.
Dora Riparia, Turia, Italy.....	148	18	160.1	4.92	4.03	4 38	Mosca.
Tongueland, England	118	38	64.8	3.5	3.0	2.79	Telford.
Dean Bridge, Scotland, in a series..	90	30	48.9	3.0	2.62	2.88	Telford.
Falls Bridge, Phila. & Reading R. R.	78	25	43	3.0	2.46	2.27	Steele.
Chestnut St. Bridge, Phila., brick in cement.....	60	18	34	2.5	2.2	2.0	Kneass.
Philadelphia and Reading R. R...	44	8	34.3	2.5	2 8	2.02	Steele.
" " " " ...	31.2	5	26.8	1.66	1.83	1.79	Steele.

Table II., taken from Trautwine's Civil Engineers' Hand-Book, gives the depth of keystone for arches of first class cut-stone, according to Trautwine's rule. For second-class cut stone add about one-eighth part, and for good rubble or brick about one-fourth part.

TABLE II.

Table of Keystones for arches of first-class cut-stone.

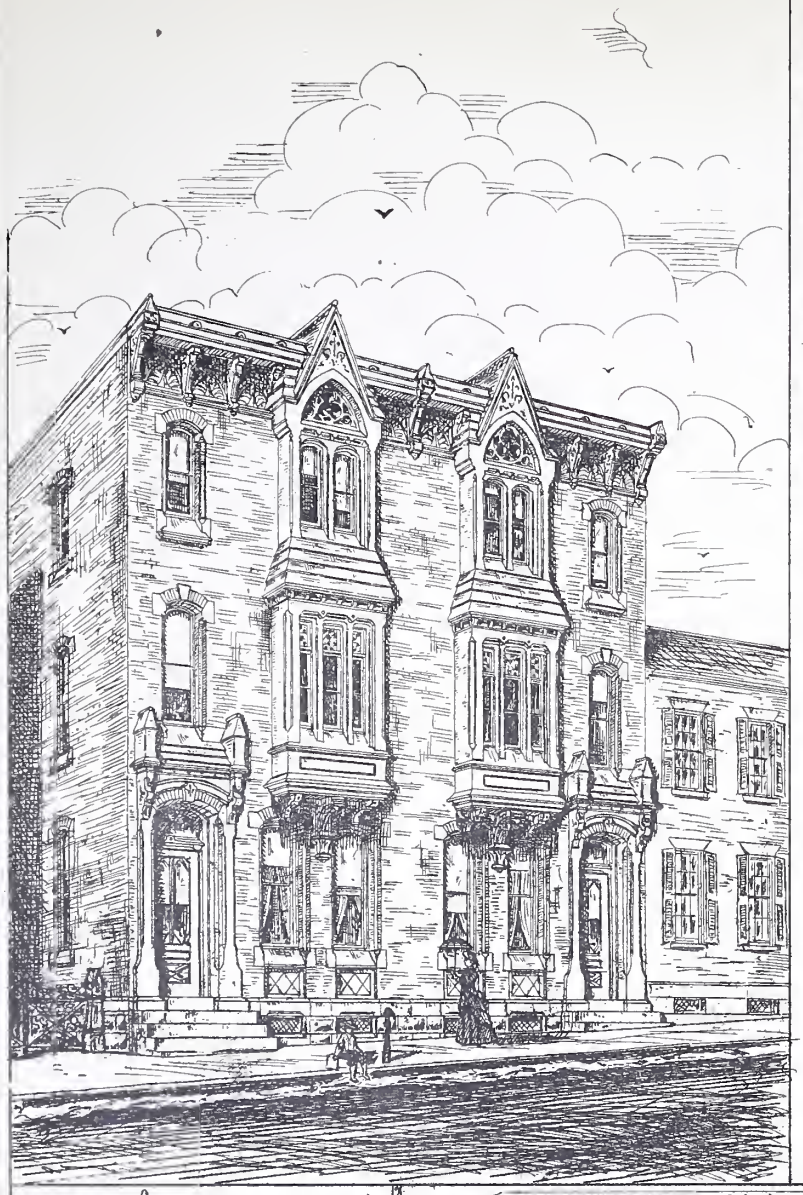
Span. Feet.	Rise in Parts of the Span.						
	1/2	1/3	1/4	1/5	1/6	1/8	1/10
	Key. Ft.	Key. Ft.	Key. Ft.	Key. Ft.	Key. Ft.	Key. Ft.	Key. Ft.
2	.55	.56	.58	.60	.61	.64	.68
4	.70	.72	.74	.76	.79	.83	.88
6	.81	.83	.86	.89	.92	.97	1.03
8	.91	.93	.96	1.00	1.03	1.09	1.16
10	.99	1.01	1.04	1.07	1.11	1.18	1.26
15	1.17	1.19	1.22	1.26	1.30	1.40	1.50
20	1.32	1.35	1.38	1.43	1.48	1.59	1.70
25	1.45	1.48	1 53	1.58	1.64	1 76	1.88
30	1.57	1.60	1.65	1.71	1.78	1.91	2.04
35	1.68	1.70	1.76	1.83	1.90	2 04	2.19
40	1.78	1.81	1.88	1.95	2.03	2.18	2.33
50	1.97	2.00	2.08	2.16	2.25	2.41	2.58
60	2.14	2.18	2.26	2.35	2.44	2.62	2.80
80	2.44	2.49	2.58	2.68	2.78	2.98	3.18
100	2.70	2.75	2.86	2.97	3.09	3.32	3.55
120	2.94	2.99	3.10	3.22	3.35	3.61	3.88
140	3.16	3.21	3.33	3.46	3.60	3.87	4.15
160	3.36	3.44	3.58	3.72	3.87	4.17	
180	3.56	3.62	3.75	3.90	4.06	4.38	
200	3.74	3.81	3.95	4.12	4.29		
220	3.91	4.00	4.13	4.30	4.48		
240	4.07	4.15	4.30	4.48			
260	4 23	4.31	4.47	4.66			
280	4 38	4.46	4.63				
300	4.53	4.62	4.80				

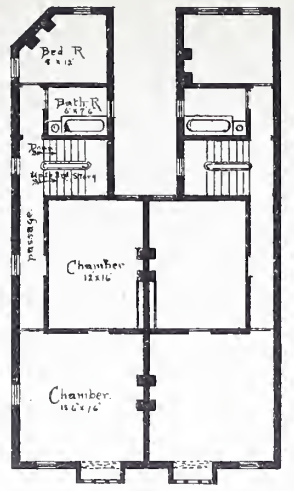
Having decided what the thickness of the arch ring will be, it remains to determine whether such an arch would be stable if built.

The following example will illustrate the method of determining this point :

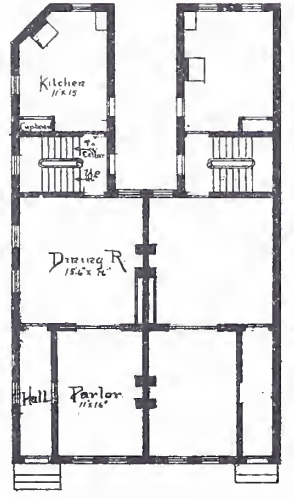
Example I, unloaded semicircular arch of 20 feet span.

First, to find the depth of keystone, we will take Rankin's rule, and by it we have,—

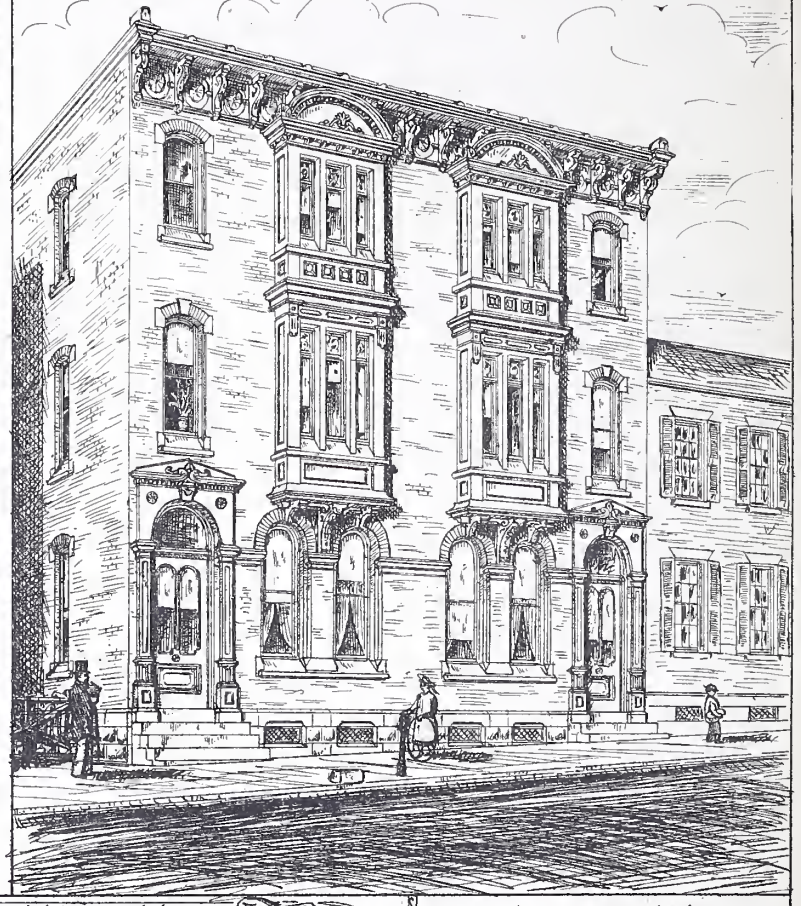




2nd Story Plan.



1st Story Plan.



E. M. HOWARD, ARCHT.

ALTERNATIVE DESIGNS for DOUBLE RESIDENCE of DR. W. J. BATES, Esq.

WHEELING, W. VA.

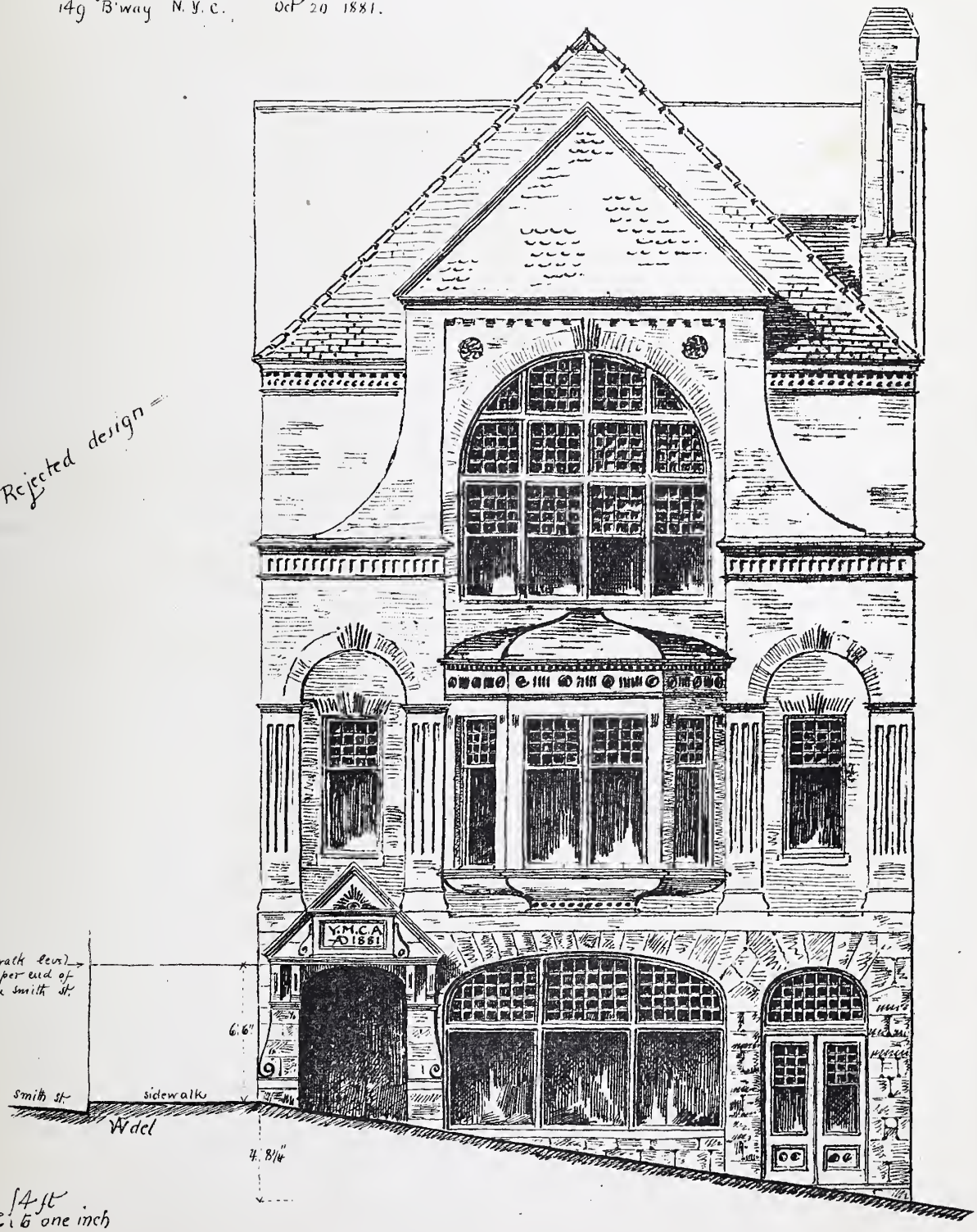
PLATE No. 59

competitive sketches

Y.M.C.A. Building Newburgh N.Y.

Rossiter and Wright Architects
149 B'way N.Y.C. Oct 20 1881.

Rejected design



Scale 4 ft to one inch

Elevation on 3d Street.

$$\text{Depth of key} = \sqrt{.12 \times 10} = \sqrt{1.2} = 1.1 \text{ ft.}$$

Trautwine's rule would give us the same,

$$\text{or, } \frac{\sqrt{10} + 10}{4} + .2 \text{ feet} = 1.1 \text{ ft.}$$

But if we should compute the stability of a semicircular arch of 20 feet span, and 1.1 feet depth of keystone, we should find that the arch was very unstable; hence in this case we must throw the rule aside and go by our own judgment. In the opinion of the writer, such an arch should have at least 2½ feet depth of arch ring, and we will try the stability of the arch with that thickness.

In all calculations on the arch, it is customary to consider the arch to be one foot thick at right angles to its face, for it is evident that if an arch one foot thick is stable, any number of arches of the same dimensions built alongside of it would be stable.

Graphic Solution of the Stability of the Arch.—The most convenient method of determining the stability of the arch is by the graphic method, as it is called.

First draw one-half the arch to as large a scale as convenient, and divide it up into voussoirs of equal size. In this example, shown in Fig. 3, we have divided the arch ring into 10 equal voussoirs. (It is not necessary that these should be the actual voussoirs of which the arch is built.) The next step is to find the area of each voussoir. Where the arch ring is divided into voussoirs of equal size, this is easiest done by computing the area of the arch ring and dividing by the number of voussoirs.

Rule for area of one-half of arch ring is as follows :

Area in sq. ft. = .7854 × (outside radius squared — inside radius squared).

In this example the whole area equals $.7854 \times (12.5^2 - 10^2) = 42.2$ sq. ft. As there are 10 equal voussoirs, the area of each voussoir is 4.4 sq. ft.

Having drawn out one-half of the arch ring, we divide each joint into 3 equal parts, and from the point A, Fig. 3, we lay off to a scale the area of each voussoir, one below the other, commencing with the top voussoir. The whole length of the line A E, will equal the whole area drawn to same scale.

The next step is to find the vertical line passing through the center of gravity of the whole arch ring. To do this it is first necessary to draw vertical lines through the center of gravity of each voussoir. The center of gravity of one voussoir can be found by the method of diagonals, as in the second voussoir from the top, Fig. 3. Having the center of gravity of one voussoir, the centers of gravity of the others can easily be obtained from it.

Next, from A and E, Fig. 3, draw lines at 45° with A E, intersecting at O. Draw O 1, O 2, O 3, etc. Then where A O intersects the first vertical line at *a*, draw a line parallel to O 1, intersecting the second vertical at *b*. Draw *b c* parallel to O 2, *c d* parallel to O 3, and so on to *k u* parallel to O 10. Prolong this line downward until it intersects A O, prolonged at D. Then a vertical line drawn through D will pass through the center of gravity of the arch ring.

Now, draw a horizontal line through A (the upper part of the middle third) and a vertical line through O, the two lines intersecting at C. Fig. 3.

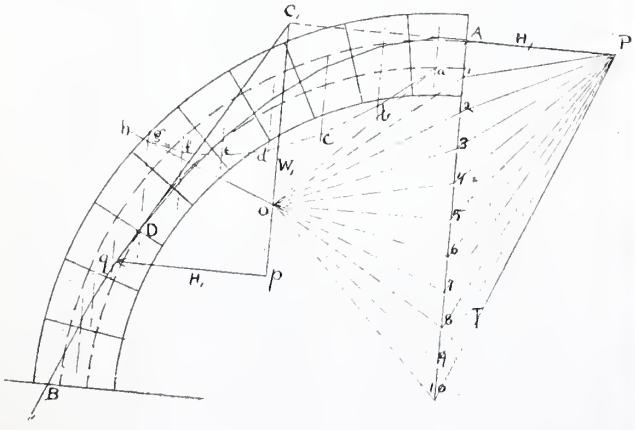


FIG. 4.

Now that the arch shall be stable, it is considered necessary that it shall be possible to draw a line of resistance of the arch within the middle third. We will, then, first assume that the line of resistance shall act at A, and come out at B.

Then draw the line C B, and a horizontal line opposite the point 10, between Q and P. This horizontal line represents the horizontal thrust at the crown.

Draw A P equal to Q P, and the lines P 1, P 2, P 3, &c.

Then from the point where A C prolonged intersects the first vertical, draw a line to the second vertical, parallel to P 1, from this point a line to the second vertical, parallel to P 2, and so on. The last line should pass through B. If these lines, which we will call the line of resistance, all lie within the middle third, the arch may be considered to be stable. Should the line of resistance pass outside of the arch ring, the arch should be considered unstable. In Fig. 3 this line does not all lie in the middle third, and we must see if a line of resistance can be yet drawn within that limit.

The line of resistance in Fig. 3 passes farthest from the middle third at the seventh joint from the top, and we will next pass a line of resistance through A, and where the lower line of the middle third cuts the 7th joint, or at D, Fig. 4.

To do this we must prolong the line *g h*, parallel to O 7, until it intersects A O. In this case it intersects it at O, but this is merely an accident. It would not always do so. Through O draw a vertical intersecting P A prolonged at C. Draw a line through C and D, and the horizontal line P Q. Fig. 4, opposite the point 7, this line represents the new horizontal thrust H. Draw A P = P Q, and the lines P 1, P 2, &c. Then draw the line of resistance as before. It should pass through D, if drawn correctly. This time we see that the line of resistance lies within the middle third except just a short distance at the springing, and hence we may consider the arch stable. If it had gone outside the middle third this time, to any great extent, we should have considered the arch unstable.

Chats with our Carvers.

FLORAL FORMS AS APPLIED TO "QUEEN ANNE."

"By slow degrees to noble arts we rise."

WE shall not apologize for inviting our carvers to consider yet further the treasures of nature that lie so handy to their chisels. At this time of the year, when vegetation is bursting forth into so many new and vigorous forms, opportunities occur for the study of natural design that do not present themselves at other seasons. As the poet Arnold puts it,—

> "In the sweet spring days,
> With whitening hedges and uncrumpling fern,
> And blue-bells trembling by the forest ways,
> And scent of hay new-mown,"

there are especial charms which may be turned to profitable account. Flowers, "earth-stars," as they have been aptly called, are in themselves so beautiful, that to say anything to commend their study seems almost as superfluous as to paint the lily, or to gild refined gold. It may, however, happen that some of our carvers, from the matter never having been brought under their notice, or owing to a town life or other hindering cause, have not hitherto fully appreciated these natural beauties, or have failed to see in them any practical bearing for themselves. To such we again address ourselves, hoping to demonstrate to them that in the study of such subjects they may gain both enjoyment and profit. A loving appreciation of nature has in all ages characterized the noblest minds, and the advantage of such study in the art school of Dame Nature was beautifully put by Professor Richmond, in his recent Oxford addresses. At the risk of being charged with plagiarism, we embody his remarks upon this topic *in extenso*, for they so exactly convey the lessons we wish to impress upon our "wood sculptors."

"Now I would ask you," says the Professor, "to follow me into the fields and there to see whether it would not be a pity that any student of art should ever go there without his pencil and book. In the first place, we all know that nature is inexhaustible, that her power of suggesting forms and combinations of forms is endless. It was in old days from natural objects that the Greeks derived their patterns, the Byzantine artists their interweaving designs of flowing vines, and the Goths found out their endless wreath of ornament. Only recently a Persian carpet, dating from the end of the sixteenth century, was shown to me. In words it is impossible to convey any idea whatever of the variety of flowers which covered the surface, flowers not conventionally but truly drawn, while at the same time they were arranged and ordered with sufficient geometrical precision to form a definite pattern. Now each and every one of the flowers woven in this carpet must have been studied carefully from nature, for the daintiness of drawing, finish of color, and characteristic growth could not have been so finely conceived or so various in all their attributes had not the artist been fully alive to the beauty of nature. If there is to come a new style, an individual style, let us call it—by individual I mean the workings of a man's taste made visible in his art—it must be through the study of nature acting upon a trained taste formed on the example of good works of art. Having learnt what the laws of design are, having acquired taste for that which is most pleasing in the combination of lines, by contact with specimens from Greek, Roman, Byzantine, or Gothic designs, let him who is prompted with a desire to express himself in form betake himself to fields or gardens, and there draw whatever he admires in leaf or flower. And let him do this in courage, trusting that the judgment born in him by the experience he has gained in the study of good work will not fail him. Gathering thus from nature, a true student will get

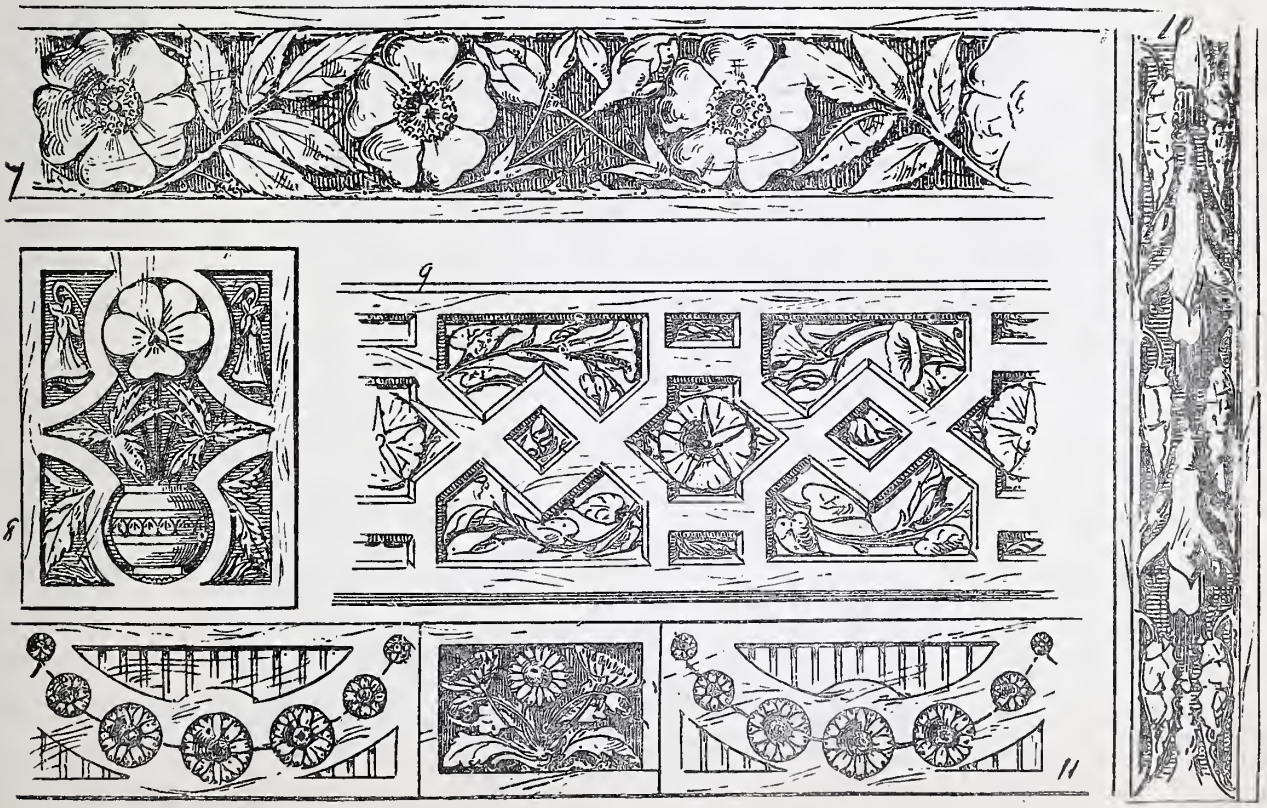
material to work upon in his designs, and he will find himself anxious to express himself rather than to copy others. We must remember that in old times the architect of a cathedral, church, or building, for whatever purpose designed, trusted much to the workmen for the details of carving and ornament. These workmen varied (as we see by their workmanship) in natural ability. Some were cleverer designers than others were, some had more fancy than others had, whilst again others among them were little else than excellent manipulators, or good carvers in marble or stone. But such men as these were true artists, and one of the great interests, especially in Norman or early English architecture, is the presence of the affections of many minds, the variety of invention, and variety of design, so got, and only so, by the individual character of every workman's taste being stamped upon all his achievements. I cannot, for my own part, see why the same method of labor should not apply to modern management. I cannot see why, if the stonemason lived simply, cultivated his taste (this he has plenty of facility for doing), and during his spare hours lived the life of an artist, during his walks studying nature and art, in holiday time refreshing his body and mind in the fields, learning lessons in design from plants, flowers, herbs, weeds—in fact, whatever he came across—I say I cannot see why the carvers of our churches should remain mechanics only, nor can I see why he should not be a designer and artist, as were the masons of past times. Whether he be trusted must depend upon himself, and before the workman of to-day is trusted to design, it must be quite certain that desire to do really good work exists in him, and, further, that those artisans who would be dignified by the title of artist must, in the first place, prove themselves to be honest workmen. They must give evidence that there is no desire to scamp any work laid before them to execute. Faithful in copying with the utmost exactness, being animated by desire for perfection, work must be the pleasure, and labor the distinguished element, of him who desires ever to be truly an artist No really good designer ever scamps his work; in fact, it is just in proportion to the strength of imagination that the artist will keep up through toil, and become thereby the buttress of his invention. Whatever you find in art of good design, whatever has lasted through fashion and changes of opinion, will always be marked by good and perfect workmanship. There is to be found a reward in art greater than can be got by money, and more, the best economy for every workman is good work and absolute conscientious labor. This must tell in the long run, and will, if persisted in through all temptations to slacken exertion, ultimately prove to be physically and morally successful."

By way of practically illustrating Professor Richmond's admirable advice, we annex a few simple examples of floral forms as applied to Queen Anne. In rough pen-and-ink sketches it is difficult to do more than indicate the flowers treated, so that a few explanatory notes are necessary. Fig. 7 is a conventional rendering of the field rose, the flower and leaf of which is very pretty, and well adapted for the decoration of a long panel, drawer-front, or frieze. Fig. 8 is intended to indicate a little pansy panel, that can be matched up with any similar flower. Fig. 9 shows how a creeper may be entwined amongst geometrical forms with pleasing effect. In this case the major convolvulus had been employed.

Some floral forms lend themselves better to a perpendicular than a horizontal position, and it is well to consider the nature of the flower or plant before placing it. Thus, to enrich the molding shown in Fig. 10, the fuchsia is used, for as thus applied it retains the manner of its growth. "Daisy chains" suggest the joys of bucolic childhood, and daisy "swags," as shown in Fig. 11, are just as appropriate and pleasing.

It would be wise of the young carver to pop out into the fields, gather a specimen of each of these examples, and make full-size drawings of the flowers for his portfolio, saving them against a rainy day. Such a bank of natural wealth will yield good interest in years to come, and there will be found, as Professor Richmond says, "a reward in art greater than can be got by money."

It may be well to refer yet again to the advantages of "conventional" *versus* purely "natural" treatment, and in order to make the two terms distinct we may give a definition from a standard authority: "Naturalism is the direct imitation of natural forms, the ambition of the designer being to make his work as much like the real thing as possible; while conventionalism, deriving its inspiration from nature, modifies the forms to suit the requirements of ornament. Naturalism is animal or vegetable form merely applied; conventionalism is nature adapted. 'Ornamentation,' to quote one of our greatest writers on art, 'should be natural; that is to say, should in some degree express or adopt the beauty of natural objects; it does not hence follow that it should be an exact imitation of, or endeavor to supersede, God's works.' It may consist only in a partial adoption of and compliance with the usual forms of natural things, without at all going to the point of imitation; and it is possible that the point of imitation may be closely reached by ornaments which, nevertheless, are entirely unfit for their place, and are the signs of a degraded ambition and an ignorant dexterity." To indicate the lines of such study in a simple and practical way is merely the object of these chapters. To those who would pursue their researches more extensively, we would recommend the perusal of Mr J. K. Collings' "Art Botany" and various standard works on plant form.—*The Cabinet Maker.*



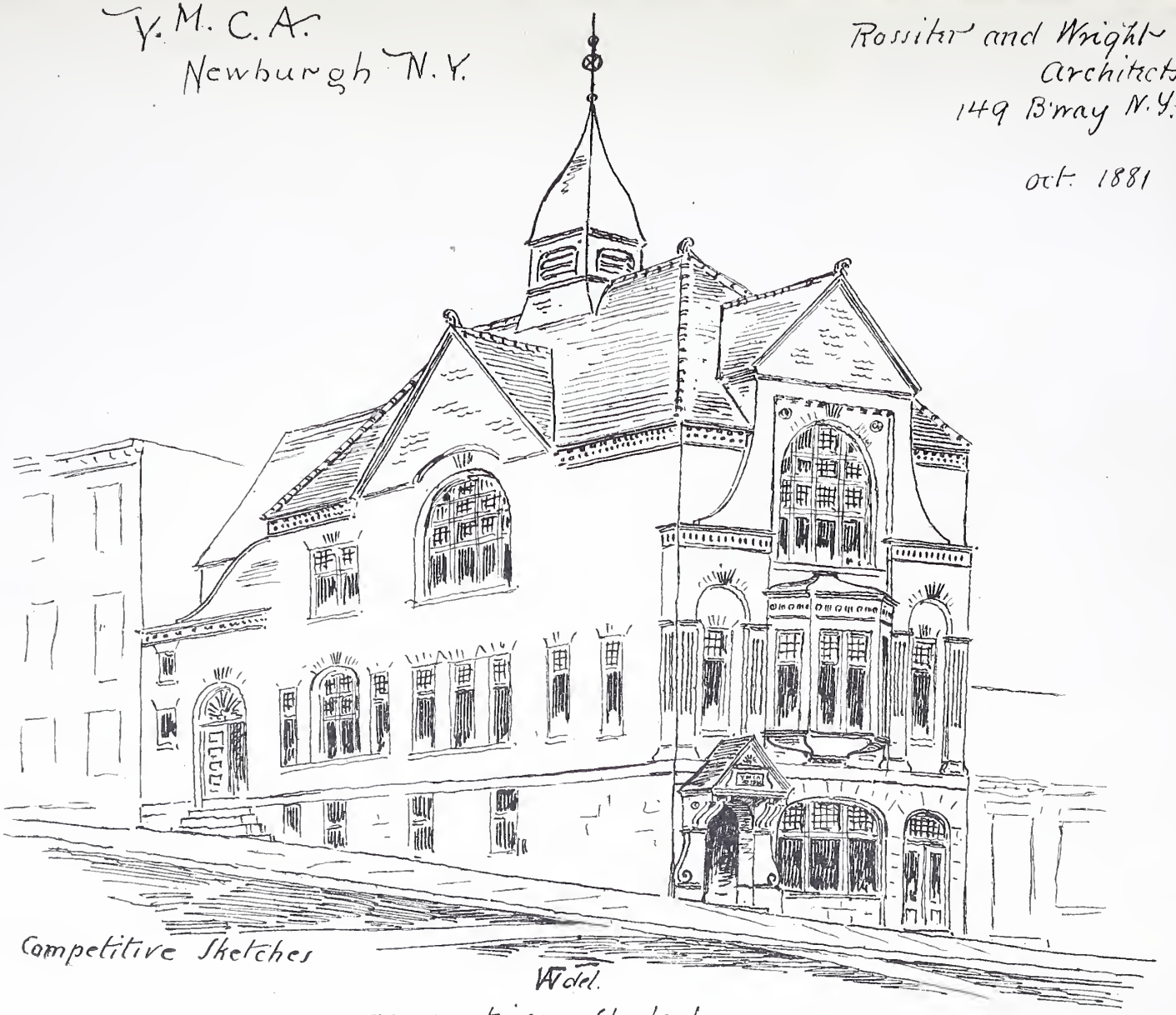
A New Pony Planer.

SOME time ago we referred to the surface planers made by J. S. Graham & Co., Rochester, N. Y. The machine described at that time met with such favor that the firm, although pressed with orders, determined to complete the line of planers, and with this view, designed and made a No. 3 Pony, an illustration of

Y. M. C. A.
Newburgh N. Y.

Rossiter and Wright
Architects
149 B'way N.Y.C.

Oct. 1881

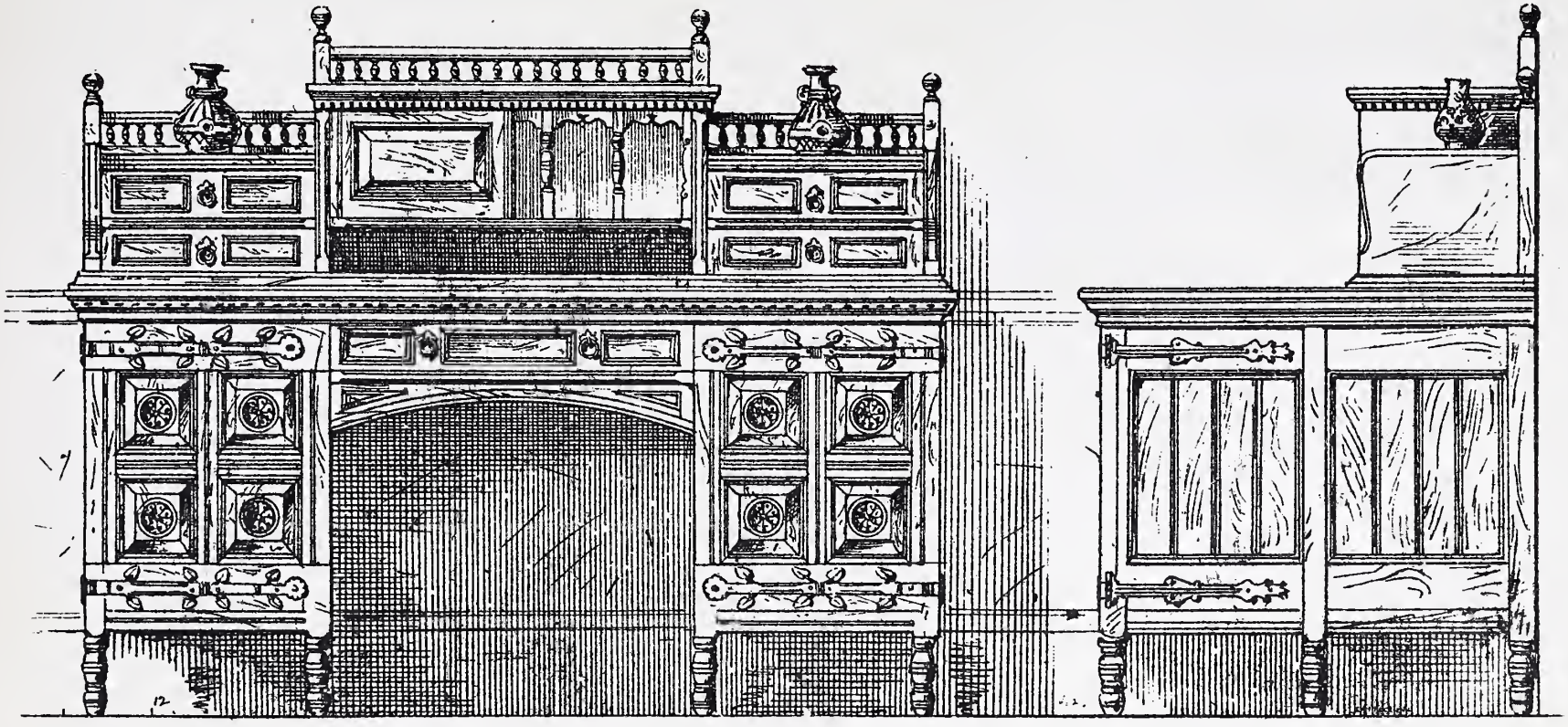


Competitive Sketches

W del.

perspective sketch
from cor 3d and Smith Sts

Dining Room.



"FASHIONABLE FURNITURE."
J. O'Kane, Pub., New York.

B. S. Talbert.

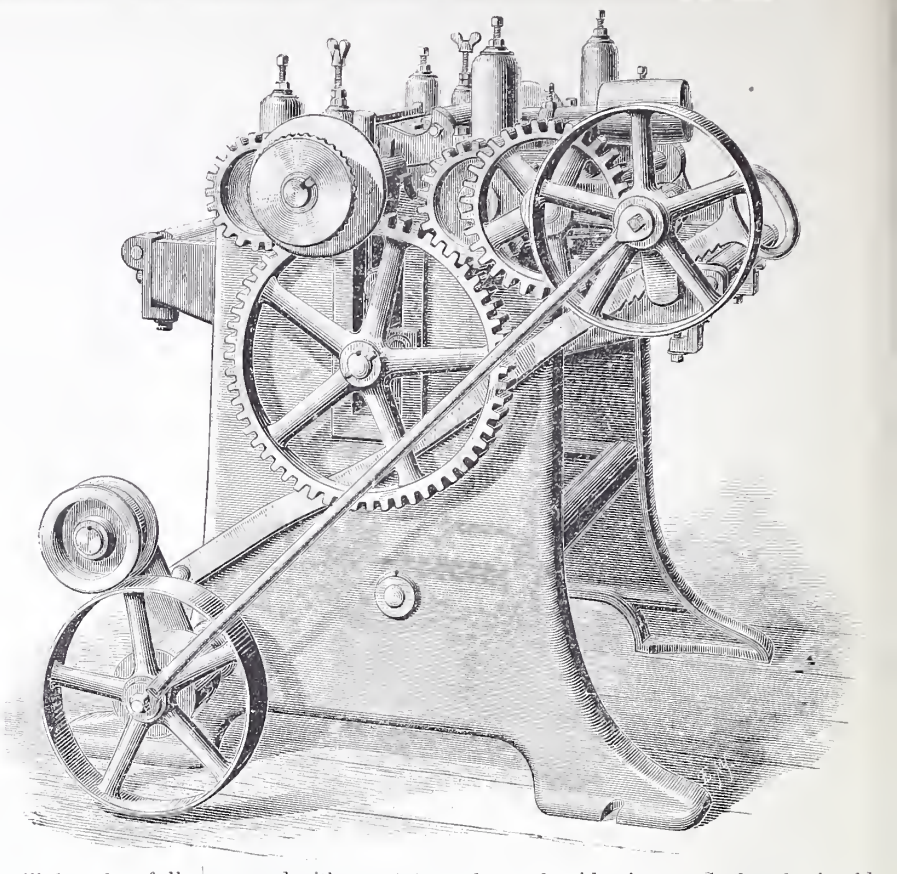
which is herewith shown. It is the lightest planer of the kind the firm manufacture.

Compactness, durability, simplicity, strength and ease of adjustment, should be the aim of designers of these machines, and our readers will agree with us that the desired results have been obtained in the planer presented.

The No. 3 weighs 1,400 lbs.; has four feed rolls, and three changes of feed, started and stopped by a tightener. The bed is closely fitted in heavy ways, and the thickness planed is indicated by an index. The cutter head is iron, with steel caps under the knives, and a hard tool steel shaft running in large and long bearings cast solid on the frame, and filled with the best genuine Babbitt metal.

Owing to the improved pressure bars, very thin or short stuff can be worked, as thin as $\frac{1}{16}$ in. and as short as 4 inches. The pressure bar on the rough lumber yields readily to any inequality of the lumber, holding it firmly on the bed, does not retard the feed, and the hardest and most cross-grained lumber can be planed ready for sand papering.

This firm have now a full line, Nos. 1, 2, and 3, particularly adapted for fine work on hard woods, or to meet the demands of those who desire a compact machine to produce a large amount of work. They differ only in size, the larger doing more, but no better work, than the smaller, and all having the same improved construction.



Catalogues and any information desired, will be cheerfully furnished by the makers.

Stairs and Hand-Railing.

STAIRS are constructions composed of horizontal planes elevated above each other, forming steps, affording the means of communication between the different stories of a building.

In the distribution of a house of several stories, the stairs occupy an important place. In new constructions their form may be regular, but in the reparation or remodeling of old buildings, the first consideration is generally to make the distribution suitable for the living and lodging rooms, and then to convert to the use of the stairs the spaces which may remain; giving to them such forms in plan as will render them agreeable to the sight, and commodious in the use.

A great variety of form in the plans of stairs is thus in a measure forced on the designer, leading to many ingenious contrivances for overcoming difficulties, disguising defects, and enhancing accidental beauties, which he might not have adopted if unfettered in his choice. These inventions, originated by necessity, are again applied in cases where the necessity may not exist, recommended by their intrinsic beauty, or by the desire for variety in design.

As introductory to the construction of stairs, a selection of some of the more simple contrivances are here presented.

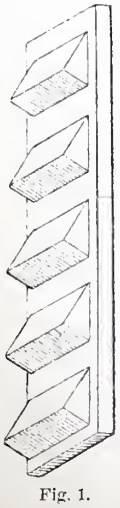


Fig. 1.

That kind of stair which, after the common ladder, is the most simple, is formed of a thick plank placed at a convenient angle to form the ascent, and upon it are nailed pieces of wood to give a firm footing. This (Fig. 1) is often used in scaffolding.

The stair next in degree is composed of horizontal planks forming steps, just sufficiently wide to give a footing; the planks are tenoned on the ends and let into mortises in two raking planks; the mortises are sometimes rectangular, as at *d* (Fig. 2), and sometimes they follow the inclination of the sides, as *b* and *c*. In the better sort the outer edge of the step has a nosing, as at *e*. The tenons of the steps are sometimes made so long as to pass entirely through the sides, and are secured by keys on the outside; to preserve the planks which form the steps from splitting, the sides of the raking pieces are grooved to receive their ends. The opposite side pieces, too, are often bound together by iron rods; one end of each rod having a rivet head, and the other end being screwed with a nut to embrace the side pieces. Such rods should be placed near the middle of a step, and close to its under side.

Fig. 2.

Another method of forming a stair expeditiously, is to notch out the side pieces on their upper edge sufficiently to receive the steps and risers, thus; *a a* the side pieces, *b b* the risers, and *c c* the step boards or treads (Fig. 3). The risers are nailed at the ends to the sides or strings, and the steps are nailed to the risers and also to the strings. Such methods as have been described are often used in warehouses, factories, and agricultural buildings.

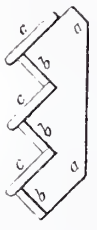


Fig. 3.

There is a contrivance for economizing space sometimes used, which, perhaps it may be well to mention, as the ascent is thereby made in about one-half the space otherwise required.

The width of this kind of stair is divided into two sets of steps, both of equal length and width, but the risers, except the first and last, are made twice the usual height; thus, if the line *a* B (Fig. 4) be 72 inches, and the width C D 33, and it is necessary to rise 80 in., divide the line *a* B in nine equal parts, and make the step equal to two of these parts; also, divide the width in two equal parts, and the height into ten equal parts, which gives 8 inches for the tread, 8 inches for the bottom riser, and 16 inches for the intermediate risers *a a*, &c., and 8 for the top riser *b*. Arrange the risers in such order that the face line of one riser shall be in the midway betwixt the face of the one next below and the one next above, as will better be seen by reference to Fig 5. The height of the risers is so disposed that the bottom riser shall have the face of the first step 8 inches from the floor, whilst the first step on *b* shall be 16 inches from the floor, and the succeeding risers 16 inches each.

In using this stair, one foot is placed on a step of one flight, as at *a* (Fig. 4), and the other on a step of the other flight, as at *b*, and so on alternately. Such stairs will only admit the passage of one person at a time.

When it is required to admit of two persons passing each other, three flights are necessary, the center flight being made wider than the exterior flights (Figs. 6 and 7). This contrivance may be used in places not sufficiently spacious to admit of stairs of the usual construction.

When houses began to be built in stories, the stairs were placed from story to story in straight flights like ladders. They were erected on the exterior of the building, and to shelter them when so placed, great projection was given to the roofs. To save the extent of space required by straight flights, the stairs were made to turn upon themselves in a spiral form, and were enclosed in turrets. A newel, either square or round, reaching from the ground to the roof, served to support the inner ends

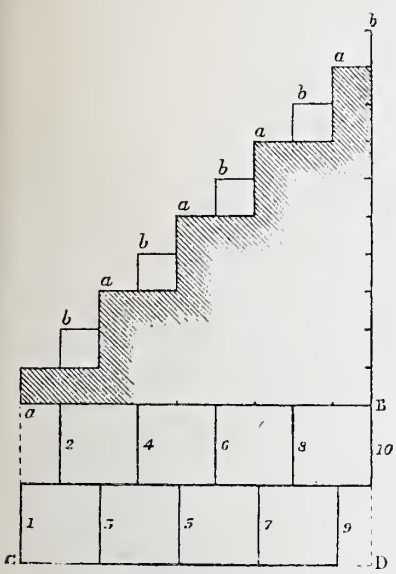


Fig. 4.

of the steps, and the outer ends were let into the walls, or supported on notched boards attached to the walls.

At a later period the stairs came to be inclosed within the building itself and for a long time preserved the spiral form, which the former situation had necessitated.

DEFINITIONS.—The apartment in which the stair is placed is called the *staircase.*

The horizontal part of a step is called the *tread,* the vertical part the *riser,* the breadth or distance from riser to riser the *going,* the distance from the first to the last riser in a flight the *going of the flight.*

When the risers are parallel with each other the stairs are of course *straight.*

When the steps are narrower at one end than the other, they are termed *winders.*

When the bottom step has a circular end, it is called a *round-end d step;* when the end is formed into a spiral, it is called a *curtail step.*

The wide step introduced as a resting-place in the ascent is *a landing,* and the top of a stair is also so called.

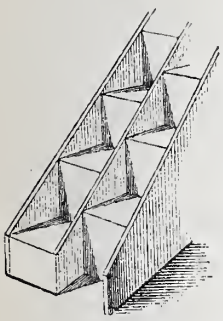


Fig. 5.

When the landing at a resting place is square, it is designated a *quarter space.*

When the landing occupies the whole width of the staircase it is called a *half space.*

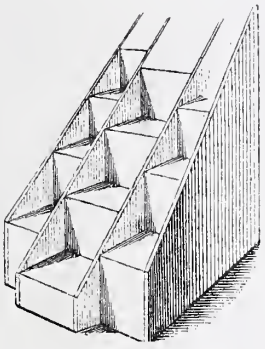


Fig. 6.

So much of a stair as is included between two landings is called a *flight,* especially if the risers are parallel with each other: the steps in this case are *fliers.*

The outward edge of a step is named the *nosing;* if it project beyond the riser, so as to receive a hollow moulding glued under it, it is a *moulded nosing.*

A straight-edge laid on the nosings represents the angle of the stairs, and is denominated the *line of nosings.*

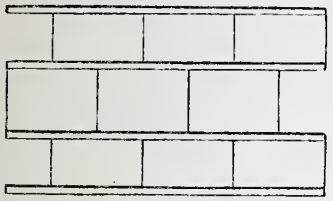


Fig. 7.

The raking pieces which support the ends of the steps are called *strings.* The inner one, placed against the wall, is the *wall string;* the other the *outer string.* If the outer string be cut to miter with the end of the riser, it is a *cut and mitered string;* but when the strings are grooved to receive the ends of the treads and risers, they are said to be *housed,* and the grooves are termed *housings.*

Stairs in which the outer string of the upper flight stands perpendicularly over that of the lower flight are called *dog-legged stairs,* otherwise *newel stairs,* from the fact of a piece of stuff called a *newel* being used as the axis of the spiral of the stair; the newel is generally ornamented by turning, or in some other way. The outer strings in such stairs are tenoned into the newel, as also are the first and last risers of the flight.

When the upper and lower strings are separated by an interval, the space is called the *well hole.* If the front string is mitered or bracketed, it is called an *open string;* if grooved, a *close string.* Where there is a well hole and no newel, and the string is continued in a curve, the curved part of the string is said to be *wreathed,* and the stair is then a *geometrical stair.*

Besides the support afforded by the strings the stair is sustained by pieces placed below the fliers; these are called *carriages;* they are composed of longitudinal and transverse pieces; the former are called *rough strings,* the latter *pitching pieces;* and the rough strings have triangular pieces called *rough brackets,* fitted to the underside of the tread and riser.

The winders are supported by rough pieces called *bearers,* wedged into the wall, and secured to the strings.

When the front string is ornamented with brackets, it is called a *bracketed stair.*

[NOTE.—These papers will be continued, and are presented more on account of their dealing thoroughly with the principles of constructing the body of stairs, than for the system they teach of forming hand-railing. We think the system of hand-railing taught by L. D. Gould and Robert Riddell much better adapted to the wants of American workmen than the system here shown, though we are aware that many workmen prefer this method. Plate 64 will be referred to in a subsequent issue.]

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor of THE BUILDER AND WOOD-WORKER:

I noticed a few months ago that one of our brother readers desired some information in regard to painting plaster. Much difference of opinion prevails as to time of painting. I have seen work painted a few weeks after the cement has set which has stood well. However, there is one point which has a great deal to do with the question of successful painting, namely the absorbency and dryness of the brick work itself. Many new walls saturated with moisture are cemented and in this condition no paint can possibly stand if laid on too soon. It is a good and safe rule to enforce, that Portland cement work should not be painted within a year of its completion to allow it to dry thoroughly; but we are safe in saying that the majority of new fronts are painted before they have been finished three months In painting plaster, white lead and linseed oil with a little dryer is recommended. Four coats are not too many to insure good work. By the absorption of the oil into the plaster the surface becomes hardened. A better plan is to give two or three coats of oil before the color is applied.

For coloring cement use the following; For black, pyrolusite 12%. Red, caput mortuum 6%. Green, ultramarine green 6%. Blue, ultramarine 5%. Yellow and brown, ocher 6%.

The strength of the plaster is strengthened by the ultramarine but weakened by the others.

Respectfully yours, J. LINK NICHOLS.

Editor of the BUILDER AND WOOD WORKER:

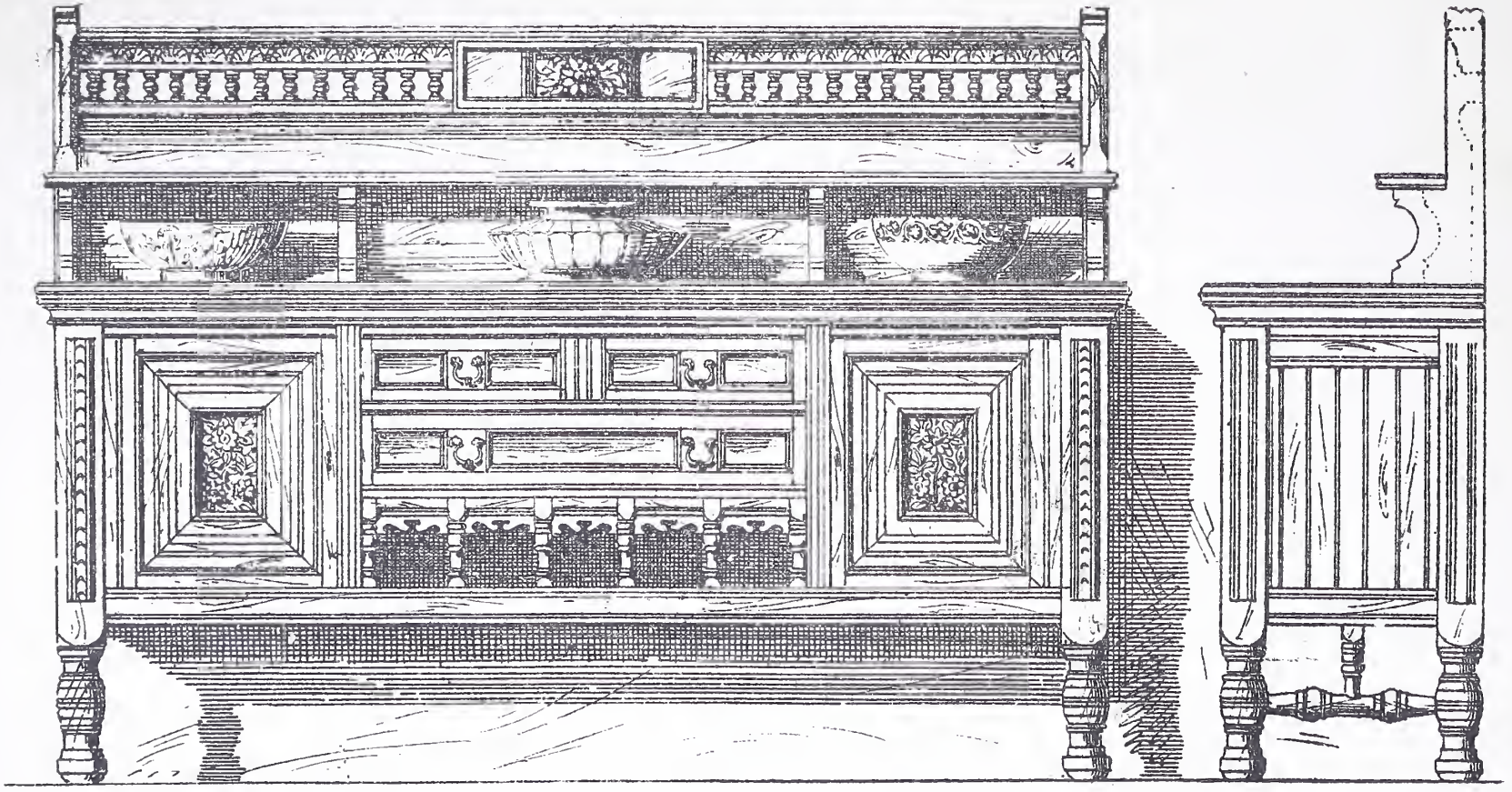
I was much interested in the short article in the April number of your paper upon the circular saw, and I inclose another of the statements which are frequently published with respect to its *supposed inventor:*

To the Editor of The Boston Journal:

So far as the writer knows in regard to the origin of circular saws in this country, I can state that somewhere about the year 1817 Mr. Thomas Holt, whose hardware store was in Dock square, opposite the foot of Elm street, sent an order to England for an invoice of hardware, and among the goods ordered were several dozen circular saws from 8-inch upward to 36 inch. What Mr. Holt wanted was saws which would saw around a circle—narrow fret saws, to cost five pounds sterling. What was his surprise to find several dozen round saws, which no mortal man that he knew of ever saw before. The lot of saws I well remember (being at that time a clerk in Mr. H.'s store) was stored in the second story, subject to the gaze of people who looked at them with wonder, till at last a Mr. Earle, manufacturer, of Worcester county, spied them, and at once concluded to use them, so that in a short time they came to be generally used, and now there are hardly any workers in wood by machinery who do not use them; in fact, they have become a necessity.

To conclude, I would state that the cost of the invoice of circular saws named above was 500 pounds sterling, amounting, of course,

Dining Room.



"FASHIONABLE FURNITURE."
J. O'Kane, Pub., New York.

B. S. Talbert.

PLATE No. 63

Design for Mantel
Built by
E. Gimbel
Dietrich, Penn
Ave. & 6th St.
Pittsburgh, Pa.

in our currency to $2,500. Yet what was a sorry purchase for Mr. Holt proved a very great advantage to our mechanics and manufacturers. William Elliot.

Greenfield, Dec. 12, 1881.

P. S If any of your numerous readers know anything of circular saws at an earlier date, let them speak *by name*. W. E.

I have long known that it was a very old invention, and have sought very diligently to learn who first used the saw in this country. Without presuming to certainly know about it, I will say that the first use of which I have any information was Constant Wyatt. In the early years of the present century, Mr. Wyatt worked at cart and wagon making in a neighborhood which is now embraced in the town of Pawtucket, R I. At the time I received the information he was still living, and I sought him and received from him in person this statement: "About the year 1809 I heard by an Englishman that there was in England a round saw in use for sawing plank and it seemed to me that such a saw would save me much hard work. I went up to a shovel factory and got a plate that had not been bent to shape, and from it I cut out a saw and filed up the teeth as well as I could and set it to going in my shop. It was rather a rough affair but it saved me much labor. Afterwards I made a better one and used it several years, and when the war was over I sent and got one from England."

I had the above statement from Mr. Wyatt many years ago and as I have not been able to learn of any one in this country who used one before him I have believed him to be the first maker, user and importer also, of circular saws in America, and that to the bright town of Pawtucket belongs not only the credit of running the first cotton mill, but also that of the first circular saw.

Yours sincerely, R. C. Hussey.

The Decoration of the Dining Room.

UTILITY comes first and foremost in the consideration of this apartment, and every article admitted for the purpose of use must be judged by the test of absolute comfort. Before discussing the various articles of furniture that should be found in a modern dining room, the treatment of the walls and woodwork demands attention. Presuming, then, that we have before us a room of the ordinary square character, such as is found in the usual middle-class house, we may begin our task. A glance will suffice to show its height, general proportions and capabilities for decoration.

Commencing with the floor, without hesitation let the edge for the space of 2 ft. all round be either stained, painted, or covered with "parquet" according to the purse of the customer. A 2 ft. margin is recommended, because the sideboard will probably be 2 ft. or 2 ft. 2 in. wide, then the carpet will not require to be tucked under the former. The error of "fitting" a dining room with carpet cannot be impressed too strongly upon the furnisher. The floor covering from time to time inevitably receives bits of food which are trodden into the surface, and the necessity for a frequent beating is obvious for sanitary reasons. This cleansing process is practically impossible with a fixed carpet. The walls next of all cry out to be appropriately covered, and whatever may be the scheme of coloring ultimately adopted, two things are most desirable—viz., a dado rail and frieze rail; whether the walls be painted or papered, these conveniences should be insisted upon. The height of the dado or chair rail is generally governed by the height of the backs of the latter. It is therefore usually placed about 2 ft. 9 in. or 3 ft. from the floor; 3 ft. is to be preferred, because the "lower carcase" of the sideboard can then be made the same height, completing the dado line around the room. It is well to adopt a molding for the rail which will serve as a continuation of the members of the sideboard top. The frieze rail is an equal source of convenience if made to answer for the double purpose of a picture; this can be achieved by fixing the hooks for the pictures into the rail itself, or better still, by placing just below it a strong iron rod, painted, and forming as it were part of the molding; common iron gas pipes will do very well for this purpose. The depth of the frieze must be subservient to the height of wall space at disposal on the pattern of paper to be eventually selected.

The question of "coloring" is a very wide and important one. It is often convenient for the house furnisher to commence by finding out the wood his customer prefers for the furniture, whether oak, mahogany, or black walnut, as when that point is settled, certain combinations can be recommended with confidence. Several schemes more or less expensive are of course open, where price is not a great object. Nothing can excel in beauty or utility an oak-paneled dado, with old stamped leather filling above, and a painted frieze surmounting all. The choice of such unique inventions as Papyrotile, or Lincrusta Walton decoration, present themselves, and certainly have much to recommend them on account of beauty, durability, and economy. Supposing, however, that a system of plain painting or flattening is desirable, some excellent effects can be obtained in colors, either in harmony or contrast. The whole range of color presents itself to the practical man for selection, so before recommending any particular scheme "what not to do" may be freely pointed out. First avoid colors that will form an injurious background to pictures, remembering the off-quoted Owen Jones' maxim, "Color should be broken over the whole surface, so as to give a general negative hue rather than masses of positive color." A little consideration will suggest those colors likely to be destructive to the tones of a landscape or a portrait, such as strong greens, &c., &c. Then, again, do not allow yourself to decide upon a coloring without seeing it in both daylight and gaslight. The difference of effect under the two aspects is most surprising. Further avoid the light apple or sage greens so much in vogue of late, as such "yellery greenery" treatments have been somewhat overdone, and certainly pall upon the taste. A very safe tone for a background to works of art is a good warm brown or chocolate color, but others are equally suitable if not too obtrusive. Much depends upon the amount of light in the apartment, a matter that must be carefully considered in relation to the coloring. Such tones, for instance, as green and blue absorb an immense amount of light; dark surfaces generally take in largely of the light falling upon them, and if plenty of sunshine is available they are to be recommended for dining room decoration.

If light is not abundant in the apartment, let the dado be deep in tone, and the upper portion of the walls tinted in a light tone to harmonize.

In the method of decoration we are now considering—viz., flat tinting in oil colors—perhaps the safest "arrangement" that can be recommended is that generally known as "monochrome," or in other words several shades in one color. Some charming effects can be produced in this way, commencing with extremely light tones and pointing down to darker. Take the following treatment adopted by Mr. R. W. Edis, for a dining room furnished in Spanish mahogany. The frieze is painted in plain vellum tone of color, and decorated with stencil pattern enrichment. The woodwork is generally of deal varnished, the panels of the doors and shutters filled in with stencil decoration in a light shade of brown under the varnish. The general wall surface is hung with an all-over pattern paper of good warm golden brown tone of color admirably adapted for pictures. Here we have a monochrome arrangement toning down from the delicate shade of the vellum to the rich, reddish brown of the Spanish mahogany. In the case of limited light it may be observed that a soft écru or cream color reflects light better even than pure white. It also has the advantage of harmonizing with a large range of colors dark and light. This class of decoration can be extended from the simple application of flat tints to an elaborate scheme of enrichment by stencil or handwork. The modern school of decorators has produced some charming ideas full of poetry and beauty for wall decoration.

Mr. Walter Crane, for instance, adopts the following motif for a wall surface, making his dado a sort of pebbly beach. The filling is supposed to represent water wherein fishes are disporting themselves, whilst in the broad frieze above, the mermaids are seen gamboling near the surface. It is such unique treatment in simple outline that has made "Walter Crane" so famous as an ornamentist. This leads up to the class of enrichment which may be applied with excellent effect to a plain ground. If such outlines as those exampled be drawn in say a plain red outline on a cream ground, a charming frieze will be the result; where the expense of figure subjects is too great, flowers, birds, animals, &c., conventionally treated may be stenciled with proportionate success. It is hardly necessary to say that a staring white ceiling is objectionable, as the rest of the coloring is thrown out of joint by its presence. A toning of some color to harmonize or contrast with the walls is desirable: say vellum, pink, or grey, with a little decoration to relieve it. Some decorators recommend a richly decorated ceiling, declaring that it should be darker than the walls, in order to secure a cosy effect. There is no doubt that a richly decorated ceiling does give magnificence to a room, but it becomes isolated and unsupported unless the wall decoration leads up to it. As our hints refer more particularly to the general middle-class house, we shall not discuss the question of expensive ceiling decoration, but proceed to consider the class of wall covering for the dining room that is most likely to be applied—viz., paperhangings. The large variety of excellent designs now made by the leading manufacturers precludes the necessity of explaining what is suitable. The principles which apply to paint apply equally to paper, whatever the coloring may be. In selecting a dining room paper, secure good bold dado and frieze. A dark dado will help to accentuate the lines of the furniture placed in front of it. The "filling" should be chosen merely as a basis for picture hanging, whilst the frieze above, being uninterrupted by pictures, should be the feature of decoration.

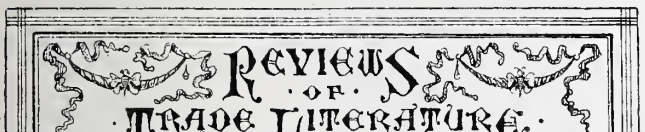
Some excellent effects are obtained by using flock papers for dado and frieze, with a plain filling for the works of art. An elaborate scheme of enrichment may also be carried out by taking a plain flock as a basis, and "picking it out" in various colors. In either case do not forget the ceiling for which now-a-days special papers are made. The pattern for such a purpose ought never to point in one direction, but should be of an "all-over" character. Having adopted either painting or paperhanging for the walls, the coloring of the woodwork is not a difficult matter. Let darker shades of the leading tones of the surface be used for it, keeping the panels

expressed in the letter, and to a certain extent, fear that the criticisms advanced are just and timely, but C. F. O. must remember that our clientage is large and contains all kinds of people, and sometimes it is necessary to cater to wants that we cannot thoroughly understand. We cannot always get such materials as we would like to offer to those who require special designs, and are, therefore, often compelled to reproduce something as near to the requirement as we can obtain. We thank C. F. O. for his kindly criticisms, and will be pleased to hear from him again—and often.

R. T. S.—The so-called "three-art crazes" are termed the 'Classic, the Mediæval, and the Esthetic." The latter is a compound of the other two, but the less said of it at this time the better. The great masters of antiquity never went groping thousands of years in the past for their inspiration; they never looked so far back in the past for their subjects, but they took the very incidents of the moments and the time in which they lived. They illustrated their own religion, their own history, their poets. We would advise you to read Ruskin's works on art, more especially his "Seven Lamps of Architecture."—"Novice" can obtain the "Hand-Rail-Holder," described in our April issue of 1880, from Gregg & Osgood, Columbus, Ohio. Original plans and drawings, if sent to this office, will be published if they contain sufficient merit or novelty. If you mix finely powdered dry white lead in your glue, it will make it much stronger and render it almost damp proof. Glue, dissolved in skim milk, is said to resist damp. This method may be easily tried.

C. F. S. says, in answer to "Builder," in the June number: "I would propose the following varieties of woods, though a great deal depends on the way he intends finishing the rooms. Black walnut for hall and library; figured ash for dining-room and kitchen and bedrooms, sycamore for sitting room and parlor." "Builder" will find that this combination will make a pleasant, harmonious finish. Our correspondent offers to furnish details of finish if "Builder" requires them.

R. S.—As regards the cleaning of picture frames, an experienced cabinet maker says that the best preparation for this purpose, and restoring furniture, especially that somewhat marred or scratched, is a mixture of three parts of linseed oil and one part spirits turpentine. It not only covers the disfigured surface, but restores wood to its original color and leaves a luster upon the surface. Put it on with a woolen cloth, and when dry rub with woolen.



We deem it our duty to keep our readers advised of the publication of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N.B.—All books reviewed in this column can be obtained from the BUILDER AND WOOD-WORKER office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

How to make Pictures. Easy Lessons for the Amateur Photographer.—By Henry Clay Price.

This is a timely little work on Amateur Photography, and gives full instructions for the making of pictures by the dry process, and in such plain and simple terms that any one possessing ordinary intelligence, will readily understand how to use the camera and take pictures within its range. The work relates more particularly to the cheap but efficient outfits that are now in the market and are becoming so popular. The little work before us should be read by every architect and builder, as it will open up to them a new field and offer suggestions for the reproduction of their works, that perhaps never occurred to them before. With an amateur's outfit, costing not more than from 10 to 15 dollars, and this book of instruction, the architect or artist will be able to reproduce his work to any extent.

The Culture and Management of our Native Forests, for Development as Timber or Ornamental Woods.—By H. W. S. Cleveland, 97 Washington street, Chicago, Ill. Price, 12 cents, in stamps.

This is a timely little pamphlet and one that should be in the hands of every person who is interested in the production of timber, standing or manufactured. The information and suggestions given are very valuable, both for their reliability and usefulness. The pamphlet comprises an essay read by Mr. Cleveland before the National Forestry Congress, Cincinnati, and the Legislature of Massachusetts.

Fashionable Furniture.—Three hundred and fifty designs of furniture of the most recent styles, J. O. Kane, publisher, 4 Cottage place, New York. Price in portfolio, $8.

This is one of the most useful contributions to art furniture literature that has appeared for some time, and is pregnant with hints and suggestions to designers of furniture, such as are rarely obtained in a single volume. The work contains a number of designs by B. J. Talbert, Architect; a series of Domestic Interiors by Henry Shaw, Architect, together with numerous miscellaneous contributions by other designers of note.

Of the "Talbert Sketches," it need only be said that they fully sustain the eminent reputation so long enjoyed by that able designer. The Interiors by Mr. Shaw also constitute a valuable feature of this work. They are characterized by a bold and graceful treatment of the various styles and phases of the high-class household taste of the period. In addition to these there are numerous drawings of the medium and higher grades of work in different styles for the furnishing of the library, office, dining-room, hall, bedroom, drawing-room, etc., by such artists as Jonquet, Scott-Morton, Timms, Ward, Robinson, Thomson, Porter, Hamer, Breckin, Foley, etc.

We show some samples of the work on plates 61 and 62 of present issue.

A Woman's Perils; or Driven from Home.—T. B. Peterson & Bros., Phila. Price—(paper), 75 cents.

The plot is remarkably ingenious and absorbing, being conceived and unfolded with surpassing skill. It treats of the misfortunes of a beautiful woman, whose husband joined the Lopez Exhibition to Cuba and disappeared. How the tangled threads are finally straightened out and the long-suffering made happy will be discovered by a perusal of the capital novel. Many of the scenes are of great intensity, and those in which little Willie Gordon and the Morton children are the principal figures are particularly bright, humorous and agreeable. This is a good story, well told, and is full of exciting incidents.

The Mysteries of Marseilles, a Love Story.—By Emile Zola, author of "Nana," and "L'Assommoir," is just published by T. B. Peterson & Brothers, and is an absorbing love story of wonderful power, realism and interest; indeed, it is safe to say that its gifted author never wrote a more remarkable work. Thorough originality characterizes every line of it, and every page teams with excitement. "The Mysteries of Marseilles" will add vastly to the fame of the author of "L'Assommoir." George D. Cox has translated it in faithful and vigorous style, preserving all Zola's peculiar ties, and showing that the great French novelist can, at times, be as tender and poetic in his expressions as Alphonse Daudet or any of the Parisian emotional writers.

☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

THOS. S. STRETTON, importer of Eucaustic and Art tiles has been compelled by increase of business to secure more spacious accommodation and has removed to No. 14 Barclay street, where he will be pleased to meet his customers and show them specimens of his recent importations. The character, quality and artistic merits of his goods are unequaled by any importing house in the city.

NOTICE.

DISSOLUTION.

PHILADELPHIA, July 1, 1882.

THE co-partnership heretofore existing between the undersigned, under the firm name of "Goodell & Waters" is this day dissolved by mutual consent. The business will be settled by Daniel A. Waters.

AUSTIN W. GOODELL.
DANIEL A. WATERS.

CO-PARTNERSHIP.

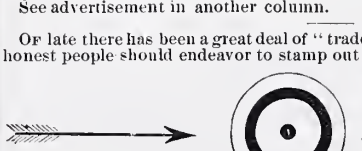
The undersigned have this day formed a co-partnership under the firm name of "Goodell & Waters," and will continue the business of manufacturing Wood-Working Machinery and as Iron Founders, as successors to the late firm of "Goodell & Waters."

DANIEL A. WATERS.
WILLIAM G. VERNON.

FOR using "Irving's Building Paper," sold by Chas. T. Harris & Co., Rutland, Vt., follow the following directions: Use over seasoned boards. Cut the paper into suitable lengths and trim all the edges square; then dampen these strips with water all over on both sides evenly with a sponge or brush; then roll them up and stand on the edge for about 15 minutes. In this way the paper swells a little, and when put on and dried shrinks down smooth. Commence on the top, and tack it on both edges about two inches apart, with ten ounce tacks; drive the tacks straight. Be careful to keep it smooth as it is tacked, which may be done by pressing it with a piece of board the width of the paper. Also tack in center of strips occasionally. After one strip is on, put on another in the same way, putting the edges close together, or lapping them; then paste a strip of cloth over the joints and tack heads before it dries. If the edges are inclined to curl up, moisten them outside with a sponge or wet cloth. After it has had time to dry thoroughly, it is ready to cover with wall paper. In laying wall paper over it, apply the paste to the wall paper only.

See advertisement in another column.

OF late there has been a great deal of "trade mark" pirating, a kind of theft that honest people should endeavor to stamp out by refusing to become a party to the illegal transaction by refraining from purchasing articles whose trade marks are pirated, and whenever occasion requires, denounce the piratical act, and wherever the case is clear, hold this act as an evidence of the commercial dishonor of the party perpetrating it. The man who is mean enough to steal a trade mark will not neglect to defraud his customers when he gets a chance. Remember this, and when you purchase tin for roofing or other purposes, get the "Old Style" roofing with the registered device—an arrow pointing to the center or "bull's eye" of a target, in connection with this brand.—N. & G. Taylor Co.'s Registered trade mark on "Old Style" roofing.



WE beg to call the attention of our readers to advertisement of THE COMSTOCK LEVEL, that appears in our advertising columns. This "level" is an entirely new and improved instrument, and is especially adapted to the use of architects, engineers, masons, builders, farmers and any one who has leveling to do or straight lines to run. The instrument possesses many advantages over many of those in general use, and will, no doubt, soon become very popular among those for whom it is designed. For circulars and particulars address William T. Comstock, manufacturer, 6 Astor Place, New York City.

ADVERTISER'S INDEX.

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WATER-PROOF, AIR-TIGHT, DURABLE, STRONG.

Better and stronger than plaster; clean, odorless and does not stick.

Used for lining, roofing, ceiling, plastering.

SCOTT PAPER COMPANY, Limited, Manufacturing Paper Dealers,

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ARCHITECTS!

ACCEPT NO OTHER!

BE SURE THAT YOU RECEIVE THE **GENUINE** AND ONLY TRUE **"OLD STYLE"**

(Makers' Brand of re-dipped or double-coated

ROOFING TIN

WHEN YOU SPECIFY IT IN YOUR CONTRACTS.

N. & C. TAYLOR CO., PHILADELPHIA,

Are the sole importers of the **GENUINE "OLD STYLE,"** and every box bears their name and contains their guarantee of quality.

BEWARE OF IMITATIONS

THAT ARE FREELY CIRCULATED WITH THE SOLE VIEW OF INJURING THE REPUTATION OF THE **GENUINE "OLD STYLE."**

SEND FOR CIRCULARS AND PRICES.

THE BUILDER & WOOD WORKER

A JOURNAL OF INDUSTRIAL ART.

PUBLISHED MONTHLY,

AT

176 Broadway, New York.

PRICE. ONE DOLLAR AND FIFTY CENTS A YEAR.

CHARLES D. LAKEY, PUBLISHER. FRED. T. HODGSON, EDITOR.

Newsdealers will please order through *The various News Companies.*

Subscriptions to Great Britain and the Continent of Europe, Australia and Japan, $2.00; China, Sandwich Islands, Mexico, and Cuba, $3.50; South America, $4,50.

N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } SEPTEMBER, 1882. { WHOLE NUMBER, 180 / NEW NUMBER, - 9

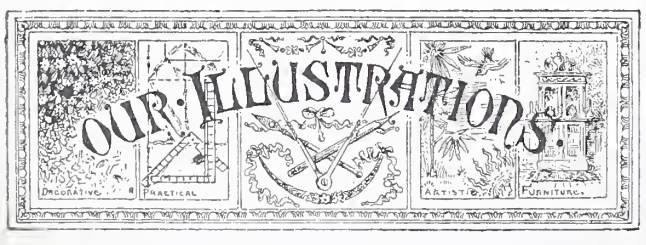
THE American Institute Fair will open on the 27th of September and bids fair to be one of the best exhibitions that have been held by this society. Applications for space are daily made. It is expected that there will be an unusual number of machines in operation. Messrs. Babcock & Wilcox are now putting in two of their new improved safety boilers, which are to furnish power for the machinery. In addition to the usual display of American manufacturers, there will be a number of mechanical inventions in operation, including carpet and silk looms, and a complete filature showing the progress of the silk industry from the cocoon to the manufactured article. There will also be a fine display of cabinet and wood-working machinery by several well-known firms. We understand, also, that a number of improved stoves, ranges and furnaces will be on exhibition along with other house-builders' requisites. The building is to be lighted by the most approved electric light. Arbuckle's Ninth Regiment Band will perform every afternoon and evening.

THE value of technical education to a nation is much better understood in Europe than in this country, and the governments of the various states in that old land feel it to be their several interests to foster, by every possible means, skilled labor and technical knowledge; and there is scarcely a town of any importance that does not contain one or more polytechnic institutions that is liberally sustained either by the national or municipal government or private endowment. The polytechnic buildings at Stuttgart and Munich cost 1,000,000 florins each, and the liberality of their endowment equals the splendor of their construction. France gives an annuity of $200,000 to three technical schools, and a grant of $400,000 a year to academies of higher art. The South Kensington Museum of Industrial Art has already cost the British government $5,000,000, and the yearly appropriation for the encouragement of technical skill is $400,000. Manchester, Leeds, Birmingham, and other towns in England can boast of their training schools; while France abounds with similar institutions, and Germany can count them by the dozen. What a contrast this showing makes with matters in this country? It is true we have a *few* technical schools, valuable and efficient so far as they reach. But they are stingily dealt with as a rule both by state and federal authorities, and would cease to have an existence if popular opinion was not in advance of corrupt statesmanship. Our legislators have too many little hatchets of their own to sharpen and polish to devote any attention—or the people's dollars—to technical education. Well, the end will come some time, and then—well, ambitious demagogues will find out that the people want servants, not masters.

DAMP houses are a fruitful source of discomfort and disease, and yet, as important as their influence is, it is amazing how seldom means are taken by which the evil may be prevented. When a house is said to be "well-drained," however true this may be of the plans adopted for carrying away the refuse water of domestic operations, it very rarely means that the site has been drained to prevent damp. When experienced medical men see house after house built on foundations of deep retentive clay, inefficiently drained, they foretell the certain appearance among the inhabitants of catarrh, rheumatism, scrofula and a host of other diseases of a similar nature. Where a damp house exists in connection with deficient sewerage, drainage or a cesspool full of decomposing material—an unfortunate—conjunction too often met with in country and suburban houses—other and more dangerous diseases, as typhus fever, are induced. The watery mist or fog rising from a damp soil affords an admirable vehicle for the more subtle and deadly exhalation of the decomposing drainage matter, by which they are too certainly conveyed to the interior of the house. And, physiologically dependent upon this condition of affairs, a mental as well as a physical depression is induced, which drives those subjected to it to the temporary relief afforded by the use of ardent spirits and other stimulants. Thus, in this, as well as in other departments of sanitation, the connection between physical and moral disease is easily traced. There can be no doubt as to the increased pecuniary and sanitary value of land suitable for building sites, arising from efficient drainage being carried out. The greater the inducements offered by the healthy condition of a neighborhood, the greater the value of the land for building sites. An excess of moisture in any district inevitably influences the local climate both as regards dryness and temperature.

THE most effectual preventive of damp houses is the complete drainage of the site on which they stand;

all other remedies are remedies but in name, more espeeially when the soil is very damp ; in sueh a case lead or slate plaeed round the bottom courses of the foundation with waterproof cement may prove efficient for the time, but will ultimately beeome inoperative. The system of drainage for earrying off surplus water from land is different from that adopted for conveying away the domestic refuse water, &c. In the latter it is essential, nay, imperative, that the drains should be water-tight, eapable of eonveying the water admitted to their interior immediately to its ultimate destination, but ineapable of passing any of it to the surrounding soil throngh which the drains are laid. The former, on the contrary, should be permeable throughout their length ; that is, have apertures of snffieient width throughout which the water of the surrounding soil ean find its way into the interior of the drain, whieh should be of sueh a shape as to facilitate the removal of the water to its destination, preventing its return to the soil. In laying and forming the drains, the following points should be attended to : The first to be observed is the uniformity of slope, or level of the bottom of the trenches. The method of aecomplishing the perfeetly uniform slope of the drains, from their highest point to their outfall, is by the use of level-rods or the spirit-level similar to the one manufaetured by Mr. Comstoek. The use of this level for drainage purposes is very simple and easily understood. Not so with the "level-rods," as the following deseription of their uses will show. Three rods are reqnired, two of them two feet long, and the third as much more than two feet as the drain is deep —that is, if the drain is three feet six inches deep, the rod must be five feet six inehes long. The rods are strips of wood with eross pieces nine inehes long on the upper end. The two shorter rods are planted upright, one on the ground on a level with the field at the head of the drain, and the other at the lower end, and a person stands at one of them looking over its top, with his eye on a line with the other. A seeond man then takes the longest rod and holds it upright in the drain, just touching the bottom, and walks along from one end of the drain to the other, keeping it in an upright position. If, while it is moving along, its top always appears on a line with the tops of the other two—as seen by the person looking along the three—the fall of the drain is uniform ; but if it rises above this line at any one place, the bottom is too high there, and requires to be reduced ; if it falls below the line the bottom is too low, and must be raised. In this way the fall may be rendered perfeetly uniform. In eutting drains the best way is to eommenee with the main drain, and at its lowest point, working gradually up to the highest. An intelligent mason or earpenter may be entrusted to made drains of this sort at very little eost, and we are sure no house owner, who cares for the health of his family, will ever regret the investment.



On Plates 65, 66 and 67, we show four elevations and two floor plans of a quaint and comfortable cottage, designed for Mr. E. K. Warren by Fred. D. White, architect, of Princeton, N. J.

This house is suitable for not only the seashore, but also almost any inland loeation. The great point which has been sought in the design is to build an effeetive yet comparatively inexpensive house. This has been gained by utilizing all possible space, and by keeping the plan so eompact that but little would be wasted in hall room.

As one enters the front door, he finds himself in a little vestibule, so to speak, formed by the stair rail. On the right a door enters into the dining room, and on the left is the sitting hall.

Sitting halls are eoming largely into use, and are found to be very convenient by those who have tried them. They eertainly give a ehanee to the designer to work ont some exeeedingly pretty effects, and a little originality, plaeed in the design of the stairs, goes a great way toward making an attractive room.

From the dining room we open into a very airy little pantry, and thenee into the kitehen, so that the two doors do good serviee in keeping the odor, necessary in eooking, from the rest of the house. Direct aeeess to the kitchen is obtained through the rear entry from under the main stairs—the landing on the stairs being high enough to allow ample head room under, when an extra step is provided. Every room in the house, including the six bedrooms, is provided with direct aeeess to a chimney flue, thus making the house serviceable the entire year. To further carry out this idea of an equally eonvenient abode for both Summer and Winter, the eonservatory or Winter piazza is to be utilized as an open piazza in Summer time. Upstairs we find a light, airy hall, one or two large elosets in every room, a linen eloset, a very pleasant front baleony opening out of two rooms and a side baleony opening from a third. We also notiee a very pretty semi-oetagon effeet in one of the front rooms.

In regard to the eoloring of the exterior, it is proposed to stain all shingles a reddish tinge, while the weatherboards are to be painted a creamy olive. All exterior trimmings are to be a dark bronze green, and the flat work in the open timbered front gable is to be rough tinted plaster of a rieh ereamy shade. The roof will look very well in a blue green slate. The house ean be built eomplete for less than $3,000, and in many localities for much less.

Plate 68 shows an office in the McLure House, Wheeling, W. Va. The design is by S. M. Howard, architeet.

The upper part of the page shows some old earved work that will prove suggestive to some of our designers and operative carvers. Fish, flesh, or fowl might more frequently be served up on our carved panels with appetizing effect. The central example is on the baek of a very fine Tudor oak longsettle. Not only are eonventional fishes attempted, but dogs, birds, reptiles, and even the now popular sunflower are there. It is carved in front and back, bearing inseriptions "Prepare for Death, Judgment, and Eternity," "Deus Videt, Q.N.T.N.L." "TYRTA MEAETA."

Plate 69, shows a Hall, and is designed in eonnection with the series of papers eommeneed in this issue, on "Simple Ways and Means for Decorating the Home."

The designs and papers on this subject are from the pen and peneil of our live eontributor Mr. Edward Dewson, of Boston, Mass. We are snre our readers will find these papers instructive and interesting.

On Plate 70 we show a parlor mantel and details, mouldings, &e. This is taken from our able English eontemporary, *The Cabinet Maker and Art Furnisher.* It is just what several of our eorrespondents have asked for :

A wooden mantelpiece in the prevailing style is now almost indispensable to every house oeeupied by fashionable folk. The ehange of eustom in this respeet has brought an enormous amount of business into the hands of the eabinet maker, and the marble masons and gilders eomplain, with reason, that they are being left out in the eold. A few years ago gilt ehimney-glasses were a matter of eourse, and no drawing room was eomplete without one or two. Now even the brokers find a diffieulty in getting rid of sueh gaudy heirlooms, for the economieal buyer is beginning to insist upon an "overmantel." To satisfy

PLATE No. 65

Cottage at Bay Mead N. J.
For Mr. E. K. Warren
Fred. B. White, Architect
Princeton, N. J.

this craving, black and gold overmantels are now produced for a pound or two, and many of them are gaudily decorated with patches of velvet and glowing painted panels. Some of our sturdy ancestors would smile if they could see such a piece of finery over the hearth, for once upon a time they were satisfied with a fire in the middle of the floor, and used the roof as the overmantel. Convenience at length dictated that the chimney should be set into the wall, and with a hooded chimney-breast brought out to meet it. When this alteration was once effected, the mantelpiece, or hood, offered a premium for the display of ornament and treasure, and the æsthetes of the time soon availed themselves of such opportunity, so that the chimneypiece soon glistened with plate, *bric-a-brac*, and articles of *vertu*. Thus the fashion we have to accommodate to-day in such an article is associated with its earliest history, but it is a question whether the modern specimens approach the magnificent chimneypieces of the good old days. When the renaissance took root in this country during the sixteenth and seventeenth centuries, the mantel became what it is rapidly becoming in these times—the most sumptuous item in the room. In recognition of this fact we annex a design in the fashionable style broadly designated "Queen Anne;" not that the mantels in the days of the good queen were after this pattern, but the use of sundry moldings and ornamental items connected with the eighteenth century justifies the style and title in this case. As a matter of fact, the fine old mantels of Jacobean days were "lost to sight, to memory dear," during the Queen Anne epoch. As soon as architects, such as Kent and Gibbs, began to put pediments on the top of their mantels, the height became lower and lower, until at last a squatty piece of entablature, with an interrupted pediment on top, was all that remained. This residue of departed glories was eventually cleared away, and the mantel consisted of the lower part only, leaving a fine space above for any monstrosity likely to catch the public fancy.

The vulgar Louis Quatorze and Louis Quinze soon provided materials for any amount of ornamental extravagance, and such men as Chippendale, Lock, Mayhew and others reaped a rich harvest in pandering to the popular taste for garish display.

The death and burial, so to speak, of the fine old overmantel was thus accomplished, and it has really remained interred until quite recently. Some few years ago it suddenly occurred to a few of our trade designers that, after all, wood was the thing for the chimneypiece, that there should be some sort of sympathy between the furniture and the fireplace, and the present rage for wooden mantels is the happy result. The revival of this old custom is therefore due to the efforts of the modern English cabinet maker, and we mention these facts that he may be proud of the result and stick to his laurels. It should certainly be the pride of our furnishers to make the most of this revived opportunity in connection with household art. In the present instance we submit to our practical readers a little design suitable for the drawing room, having, perhaps, one or two features about it out of the ordinary run. The shelving in the upper part invites the presence of suitable pottery, whilst, at the same time, a plate of moderate size in the back affords opportunity for gratifying reflections. The taste for fret work of an eighteenth century character is recognized by the introduction of a fret gallery to the top shelf. The shaped brackets or trusses to lower part not only give support to the shelf, but serve to show off some good carving if price will allow for introduction of same. The working drawing annexed make the other points sufficiently clear without further description. We may therefore proceed, for the information of our apprentice readers, to explain the best way of building up this piece of modern furniture.

The dimensions of a mantel, of course, entirely depend upon the size of the opening and width of chimney breast; consequently the workman should give these points his primary consideration. Taking it for granted that these parts vary considerably, we will, for the sake of convenience, suppose that we have to make our mantel to sketch as per scale; and we think that, after having studied the working drawings herewith, there should be no difficulty in turning out a creditable production. The article must be made in two pieces, viz., the mantel and overmantel, and we will, firstly, consider the mantel or lower part. The job should be framed out of 1½-inch solid wood, and the molded plinth mitered round and butted each side of the 2-inch truss, as shown in fig 1. The shaped truss should be run up under the frieze, which would project to receive it. Two paneled frames with 1½-inch pilasters must now be doweled between the mantelshelf and the bottom board of the frieze. All the panels along the front might then be beaded in from the back excepting the two small ones, which must be plowed in (fig. 2). The bottom board of the frieze should be on the face of the back framing, but the mantel-board must be doweled on to the top of the framing and panel frames.

The overmantel, if not of solid wood, could be framed out of 1-inch pine and faced with ½-inch hard wood, upon the edge of which the moldings might be worked, as fig. 3. The frame should be made from out to out of the outside pilasters, and in height from the base molding on bottom rail to a line level with the top of fret gallery. Here the joint might be masked by a molding which would be butted between the pilasters (fig. 4). The side pieces with shaped and carved panels could be got out of the solid, and the panels cut by the carver in low relief. They should then be doweled on to the edge of the frame, where the shelves would of course add to the stability of the article, as they could be screwed through the back. The front columns should be fixed to the shelves, as figs. 5 and 6; and the inner one could be finished under the shelf as in fig. 7; the center part of pediment would be framed up and molded as in fig. 8, and firmly doweled to the top of back frame, the pilasters being so arranged as to overlap the edges and thus form a rebate for the curved rings at the sides. The two back outside pilasters are surmounted with a turned terminal as shown in the sketch. The overmantel should now be fitted together, and when nicely bedded and fitted into its place upon the mantel will form the article complete.

Plate 71 shows elevation and details of a simple hall stand, all drawn to scale and lettered, for reference. This is an excellent sheet for amateurs or others that are not well up in making furniture. The series to which this sheet belongs will be of great service to many of our wood-working readers.

The design is by Mr. Dewson, and is fully up to his usual standard.

Plate 72 is in connection with the articles with stair-building, to which the reader is referred.

Cutters for Wood-Working Machines.

THE action of revolving cutters in planing machines is very similar to that of saws; the cutting angles, to perform satisfactory work, must vary considerably when operating on different woods. For soft wood the bevel of the cutting edge of the iron should be more extended than when used for hard wood. About 30° to the face of the iron is the best angle, whilst for hard woods about 40° to 50° is found most suitable. They may be worked at more acute angles than these, but in working hard wood they are more likely to break.

Cutters made of wrought iron, faced with steel, are better than those made of solid steel, and are easier

to make and less liable to fracture. It need hardly be remarked that for all kinds of cutters the steel employed should be of the very best quality, combining in its nature, as far as possible, toughness with hardness.

Cross cutting cutters, such as those used in tenoning machines, should be arranged to work diagonally to the grain of the wood. An angle of about 15° to the axis is usually suitable for soft wood, as it is found the nearer the cutters act with the fiber of the wood the smoother the work. Cutters for tenoning machines are made by some engineers slightly helical; we think, however, anything gained in this manner is more than lost in the extra trouble of keeping them in order, as well as the increased first cost.

As regards the angle of the cutting edges of turners' tools, it is found, for turning soft wood, an angle of about 25° is the best, as it gives a good cutting edge, and will stand to the work. Obtuse angles in turning tools are generally a mistake, as they really scrape or abrade instead of cut. The angles for a turner's finishing tool, which is sharpened on both sides and the face ground off obliquely, should be about 110° and 70°

In making molding irons, a plan generally pursued, but essentially wrong, is to cut the profile of the required molding on the edge of the steel and grind a bevel backwards from it, the result being the exact profile of the molding is constantly liable to be altered when sharpening. In the place of this the form of the molding should always be milled into the face of the cutter itself, as it thus, if sharpened to the proper bevel, retains its true form. This constant form of profile may be secured for vertical spindle molding machines, no matter how badly the cutters are sharpened, by using circular cutters. These are made from one piece of steel, in form something like a deep saucer. The periphery is shaped to the profile of the desired molding, and has several openings, which are sharpened towards the center, and present as many cutting edges to the wood. Their first cost, however, is considerably in excess of the ordinary form. Fixed cutters for planing machines should be fitted with back irons, and the cutting edge arranged at a slightly oblique angle to the wood, as the shock on the knife is thus received gradually. In establishments where a large variety of woods are worked it is advisable to have several sets of cutters ground to the various bevels best suited to the work.

Much has been written as regards tempering cutting tools; no absolute rules for wood-working machinery can, however, be laid down; it simply resolves itself into a matter of practical experience.

For working soft woods with cutters of an acute bevel a light straw color temper is suitable, whilst for harder woods, when the bevel of the cutter is made more obtuse, the temper should be made slightly harder in proportion.

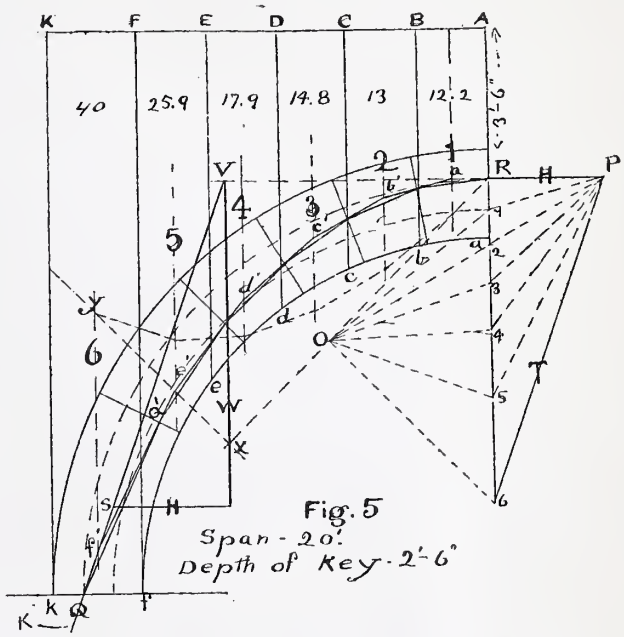
Cutters should always be ground with a double bevel, leaving at the cutting edge say about one-eighth of an inch to be whetted with a stone to a keen edge by hand; this bevel or angle can also be rapidly altered to suit different kinds of wood. Of late, for planing, it has become the practice to lessen the diameter of the cutter-block or head, and increase the number of irons; thus giving, practically speaking, a continuous cut and a better quality of work turned out.

The Stability of the Arch.

BY F. E. KIDDER. B. C. E.

(*Continued.*)

IN the August number we explained the method of determining the stability of an unloaded semi-circular arch Such a case very seldom occurs in practice, but it is a good example to illustrate the method, which applies to all other cases, with a little difference in the method of determining the center of gravity of loaded arches.



EXAMPLE II.—*Loaded or Surcharged Semi-circular Arch.*

We will take the same arch as in *Example I*, and suppose it to be loaded with a wall of masonry of the same thickness and weight per square foot as that of the arch ring; the horizontal surface of the wall being 3 feet 6 inches above the arch ring at the crown.

1st Step.—Find center of gravity.

Commencing at the crown, divide the load and arch ring into strips 2 feet wide, making the last strip the width of the arch ring at the springing. Then draw the joints as shown in Figure 5. Measure with the scale the length of each vertical line, A *a*, B *b*, etc., then the area of A *a*, B *b*, is equal to the length of A *a* + B *b*, as the distance between them is just 2 feet. The area of F *f*, *k k* is, of course, F *f* × width of arch ring.

In this case the areas of the slices are as shown by the figures on their faces, Figure 5.

Now divide the arch ring into thirds, and from the top of the middle third, at R, lay off in succession, to a scale, the areas of the slices, commencing with the first slice from the crown, A *a*, B *b*. These areas, when measured off, will be represented by the line, R 1, 2, 3....6. Figure 5. From the extremities of this line, R and 6, draw lines at 45° with a vertical intersecting at O. From O draw lines to 1, 2, 3, 4 and 5. Next draw a vertical line through the center of each slice (these lines in Figure 5 are numbered 1, 2, 3, etc.). From the point in which the line R O intersects 1, draw a line parallel to O 1, to the line 2. From this point draw a line to 3, parallel to O 2, and so on. The line parallel to O 5 will intersect 6 at Y. Then through Y, draw a line downwards at 45°, intersecting O R, at X. A vertical line drawn through X will pass through the center of gravity of the arch ring and its load.

2d Step.—To find the thrust at the crown and at the springing.

To find the thrust at the crown, draw a vertical line through X, and a horizontal line through R, intersecting at V. Now the weight of arch and load, and the resultant thrust of arch must act through this point. We will also make the condition that the thrust shall pass through Q, the outer edge of the middle third. Then the thrust of the arch must act in the line V Q. Opposite 6, draw a horizontal line H, between V X and V Q. This horizontal line represents a horizontal thrust at R, which would cause the resultant thrust of the arch to pass through Q. Now draw the horizontal line R P, equal in length to H, and from P draw lines 1, 2, 3....6. The line P 6 represents the thrust of the arch at the springing. Its amount in cubic feet of masonry can be determined by measuring its length to the proper scale.

3d Step.—To draw the line of resistance

From the point P draw lines to 1, 2, 3, 4, 5 and 6. These lines represent the magnitude and direction of the thrust at each joint of the arch. Thus P 1 represents the thrust of the first voussoir and its load; P 2 that of the first two voussoirs and their loads, and so on. Then from the point *a'*, where the line R P, prolonged, intersects the vertical line 1, draw a line *a' b'*, parallel to P 1; from

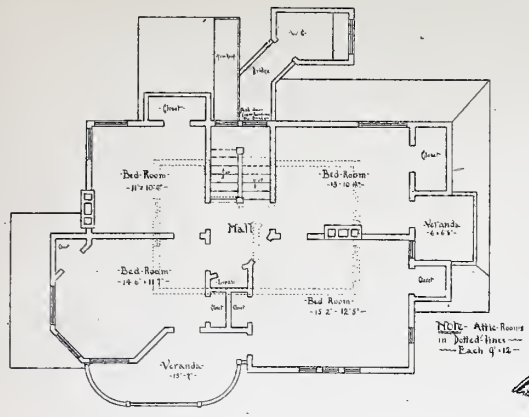
PLATE No. 66

— South · Elevation —

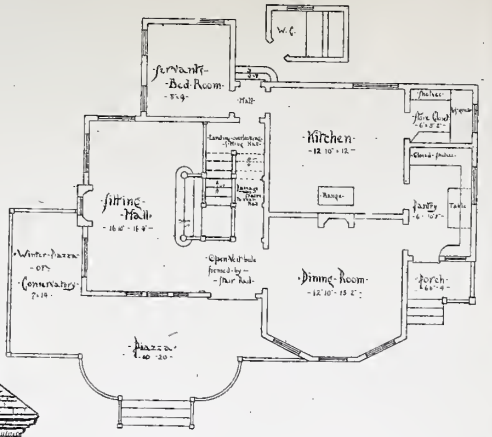
— North · Elevation —

— Cottage · at · Bay · Head · N. J. — FOR · Mr. E. K. WARREN —

..... FRED'K · B. WHITE · Architect · Princeton · N. J. .....



Second Floor Plan
Cottage at Bay Mead N.J. for Mr E.K. Warren



First Floor Plan — Cottage at Bay Mead N.J.
For Mr. E. K. Warren

F.B.W. del.

West Elevation
Cottage at Bay Mead N.J. For Mr. E.K. Warren

Fred'k B. White Architect Princeton N.J.

b', on 2, draw a line $b'\,c'$, parallel to P 2, and so on. The last line should pass through f Q, and be parallel to P 6.

Now, if we connect the points where the lines $a'\,b'$, $b'\,c'$, etc., cut the joints of the arch, we shall have a broken line, which is known as the line of resistance of the arch. If this line lies within the middle third of the arch, then we conclude that the arch is stable. If the line of resistance goes far outside of the middle, we must see if it be possible to draw another line of resistance within the middle third, and if, after a trial, we find that it is not possible, we must conclude that the arch is not safe, or unstable.

In the example which we have just been discussing, the line of resistance goes a little outside of the middle third, but it is very probable that on a second trial we should find that a line of resistance passed through R and Q' would lie almost entirely within the middle third.

We explained the method of drawing the second line of resistance under Example I, and as the same method applies to all cases we will not repeat it.

The method given for Example II. would apply equally well for a semi-elliptical arch.

EXAMPLE III.—*Segmental Arch with Load.* (Fig. 6.)

1*st Step.*—*To determine the center of gravity.*

In this case we proceed the same as in the latter, to divide the arch ring and its load into vertical slices 2 feet wide, and compute the area of the slices by measuring the length of the vertical lines A a, B b, etc. Having computed the areas of the slices, we lay them off in order from R, to a convenient scale, and then proceed exactly as in Example II., the remaining steps determining the thrust, and the lines of resistance are also the same as given under Example II.

In a flat segmental arch there is practically no need of dividing the arch ring into voussoirs, by joints radiating from a center, but to consider the joints to be vertical. Of course when built they must be made to radiate.

Figure 6 shows the computation for an arch of 40-feet span, and with a load 13½ feet high at the center. The depth of the arch ring is 2 feet 6 inches.

It will be seen that the curve of pressures lies entirely within the middle third, and hence the arch is abundantly safe or stable. It should be remarked that the line of resistance in a segmental arch should be drawn through the *lower* edge of the middle third at the springing.

It will be noticed that the horizontal thrust, and the thrust T, at the springing, are very great as compared with those in a semi-circular arch, and hence, although the segmental arch is the stronger of the two, it requires much heavier abutments.

These three examples serve to show, we think, the method of determining the stability and thrust of any arch such as is used in building.

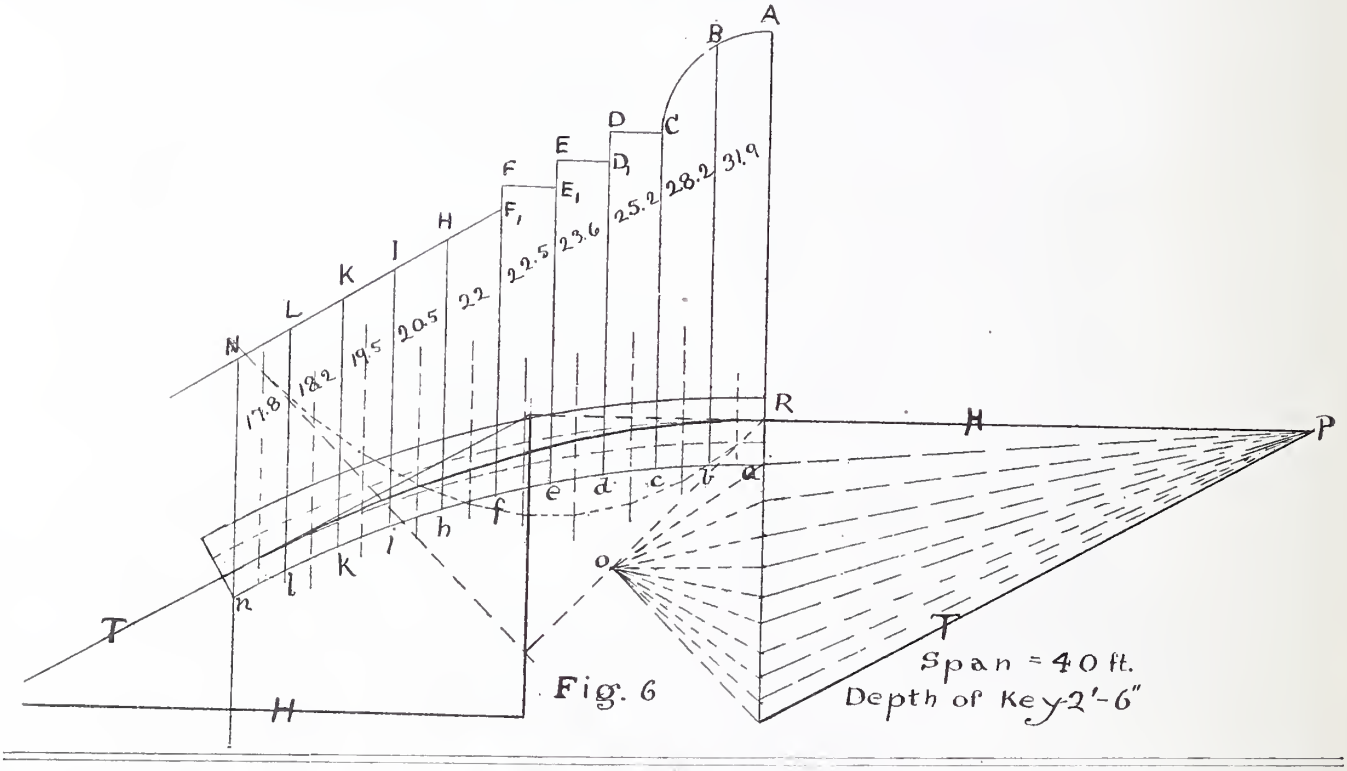


Fig. 6

SIMPLE WAYS AND MEANS FOR DECORATING THE HOME.

BY EDWARD ARCHITE WENSON. CT.

IN preparing these papers it has been the aim to embody, in the plainest language and manner, some simple ways and means of making the home life and surroundings interesting and beautiful. It is desired to show to those who are considering the expenditure of money—a little at a time, perhaps—in the adornment of their homes, how such may be done with economy, and how every spare moment may be devoted to the pleasant work.

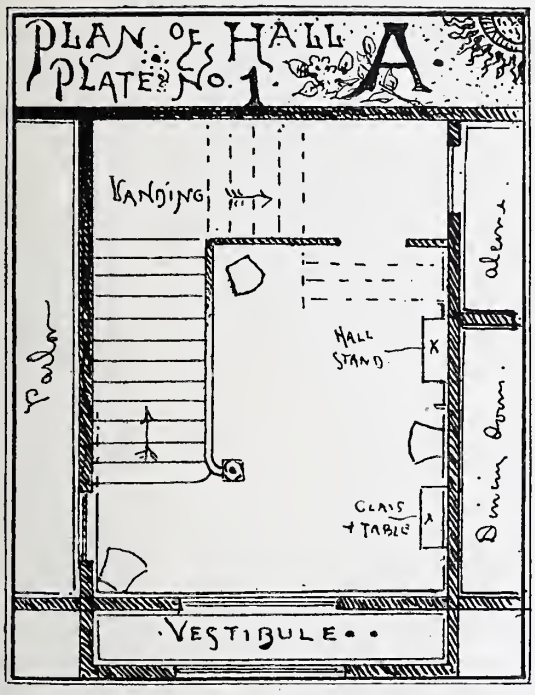
The best, in decoration as in other things, ar a rule, is the cheapest in the end, and I would advise all who contemplate furnishing or refitting, to do, where possible, but little at a time, but let that little be well done, and with the best of materials. Once well done and with good taste, it is done for all time. Good taste is good taste the world over, and it is only the extreme in styles that changes, and we are not talking here of extremes, but of simple ways and means. Speaking of extremes, reminds me that æstheticism and its disciples have been of late so noticeably before the public, and seemingly, through the precepts and practices of false prophets, so thoroughly misunderstood, that a word or two here in connection with our subject would not be out of place. The love for the beautiful finds a place in every refined mind, and is a germ that desires cultivation, and is ever on the lookout for the means of gratifying that desire. Strip æstheticism of its habiliments of charlatanism, its "vague platitudes," its lackadasiacal airs and graces—of all in fact that is unmanly—return to its original and true principles, and we find it simply a true and healthy yearning for higher knowledge and culture; a seeking to surround the home and every-day life with objects of true beauty, to fill the mind and higher thought, with soft, refining influences that may lift us out of the narrow sphere into which the prosaic duty of every-day life induces us.

Such a home is like the warm and cheerful sunshine in the lives of child and friend alike, breaking through the clouds of commonplace life, and flooding it with new and joyous thoughts and experiences, never to be forgotten as long as life itself lasts.

Thus æstheticism, robbed of its outward show and superciliousness

gloss, may be brought to bear upon our homes and lives with good and refining influence, without reproach, or fear of adverse criticism.

In these papers there is no pretense of perfection in the "science of the beautiful," but an endeavor to show how the simple principles of good taste and beauty may be brought into our home



life, with good effect, and although the subject has been well discussed by other and abler minds, there is still some room left for suggestions, both as regards economy and methods of ornamentation. I will not attempt to cater to those favored few—speaking comparatively—whose more liberal means enable them to place their home adornment and decoration into the hands of experts for supervision : such need no advice here, for they have plenty of other resources ; but the field is still open, in my opinion, on this subject of simple ways from which every-day people may gather something of use as well as interest. And among the many books that have been written on this and kindred subjects, there is very little that can be found of use to the person of average means and educated, refined tastes, to assist them in gratifying laudable ambition in this direction, without leading them into extravagances and thus into discouragements. The object which I have in view is to be of use to those who, in trying to make the journey of life more enjoyable, by pleasant surroundings, by placing in these pages something of interest that the reader may adapt to his own conditions and requirements. I do not know that I shall fully realize this object, but I can at least try.

We will first take up for consideration the average suburban house, as these vary but little, so far as number and general size of rooms are concerned, and in connection with this, will take an occasional peep into the farm-house kitchen or living room, and join the home circle, as they gather of an evening around the hearthstone in some "little cottage by the sea," or in the country. Standing now, as we are, on the threshold of our subject, I wish to say before entering, that in each style of room as we take it up for consideration, I shall try to give more than one example, in which the conditions and requirements differ materially, and will try to meet, as far as the limited space at my command will allow, the various established necessities that we shall find awaiting us at every turn, and remember, these are but a small minority of the many ways open to us. I do not argue that these are arbitrary or the best ways, but simply offer them as means I have found plain, useful and inexpensive. Having established this point in your minds, we will now cross the threshold of our subject and proceed to business.

I shall not attempt to show any definite series of connecting plans or rooms, nor shall I confine myself to the description of any one room, in more than one scheme of decoration, but will try and cover a broader field, by describing various halls, living rooms, chambers, etc., and as we go along give with each its separate plan, hoping in this way to give myself more scope, and make the subject of more interest to my readers. The outward style is of but little importance at the present time, but later on we shall see how good taste and judgment in decorating the outside surfaces will do much to make even an unsightly house an attractive object in a neighborhood, and a source of satisfaction to its inmates.

In the plan of proceeding we have adopted, I can touch on many little points I could not, should we confine ourselves to any one particular arrangement of rooms, and so be enabled to meet more fully the varied wants of my readers, by giving them hints that may be found useful, depending on the judgment in applying these to their varied requirements. Although there is some variety, in houses of this class, in the size, arrangement, etc., of rooms, each has its halls, the little-used parlor, the dining and sitting rooms, or library, kitchen and offices, and up-stairs the usual complement of chambers. First in consideration comes

THE HALL.

The first effect is received here, on entering, and our hall should give the key-note, so to speak, of the whole, and should impress the visitor by its simple and quiet dignity. In many houses I know of, this has been entirely overlooked, and the hallways considered simply as highways to the various rooms and chambers, giving but a bare, unfriendly welcome to visitors, particularly if they be strangers, chilling and absorbing all that is cheerful in them, while passing through this common-place ugliness to the living rooms beyond. Now all this is unnecessary and wrong, for narrow, dark and unpromising as our halls may be, and very often are, there surely is something we can do to give them their proper dignity and place, as the entrance to a pretty and cheerful home. I suggest hard wood floors laid in strips, or a quiet pattern with a

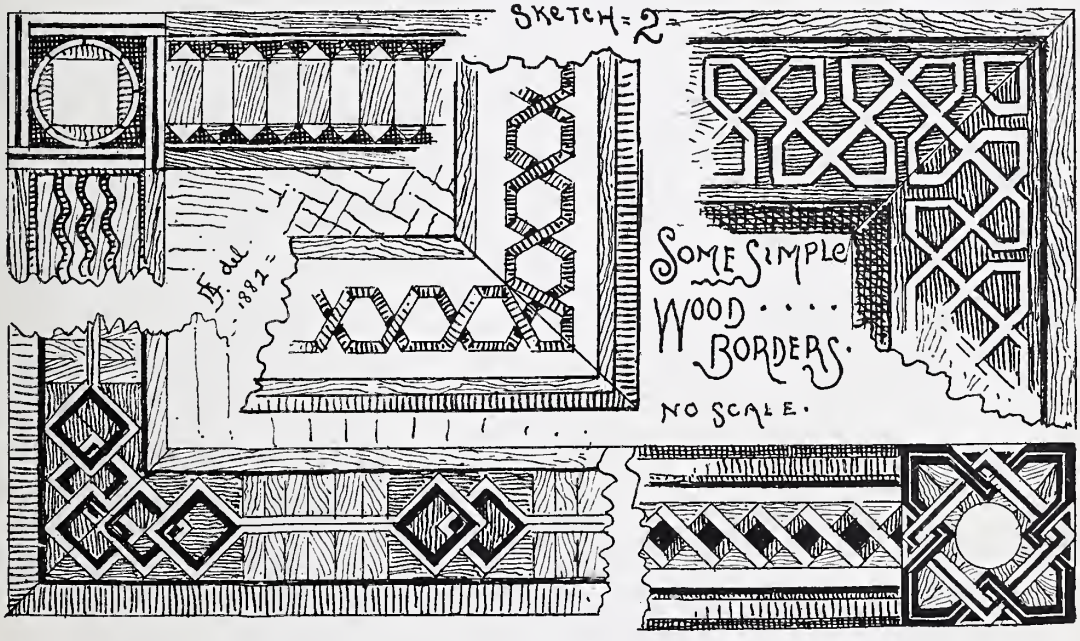
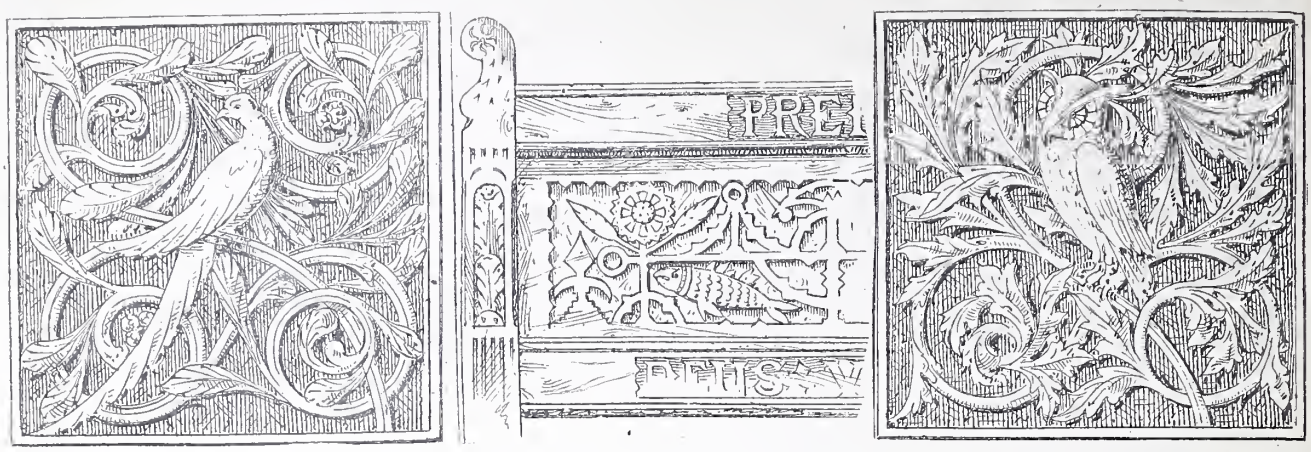
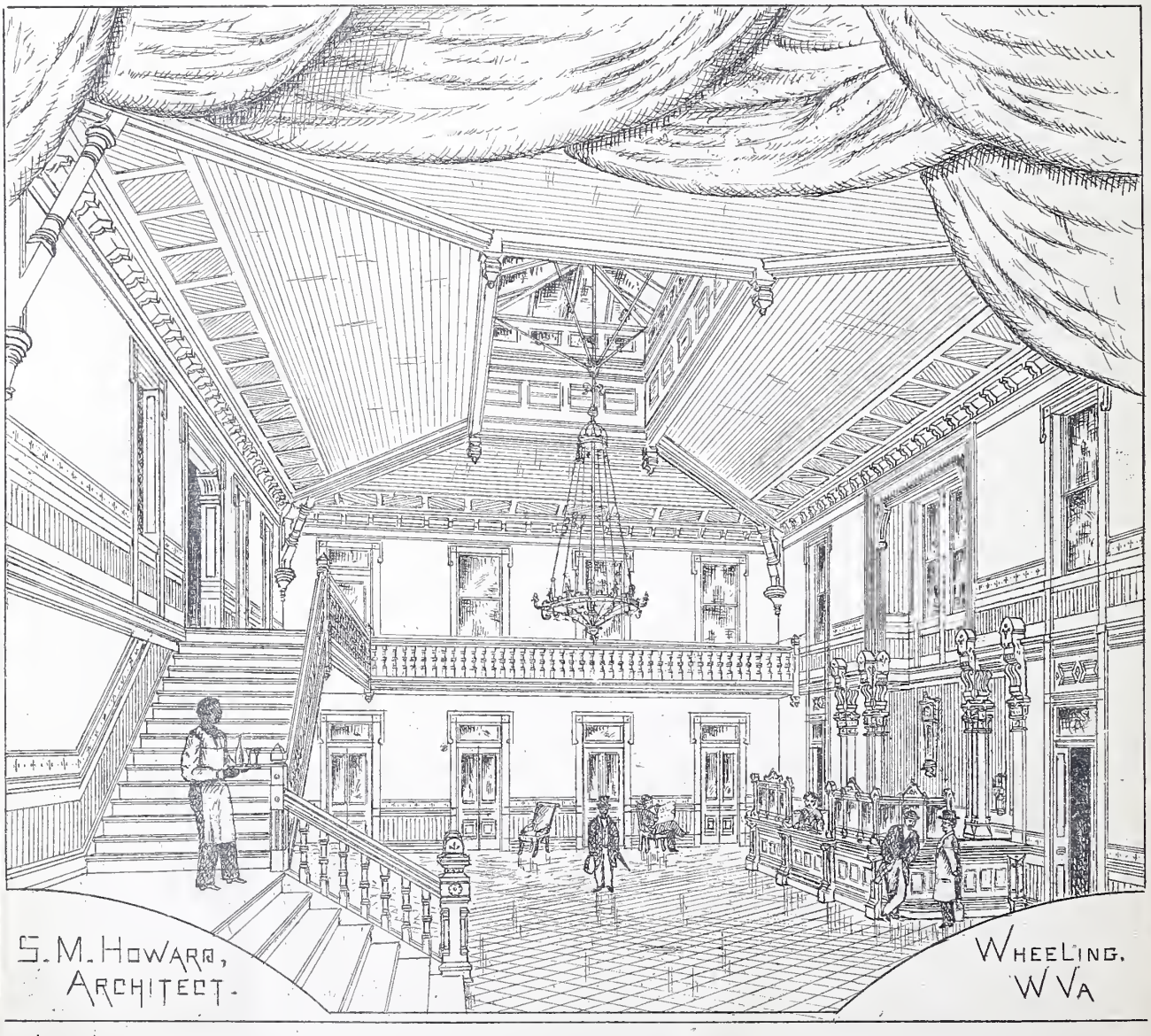


PLATE No. 68



Some Old Carvings.



NEW Mc LURE HOUSE OFFICE — VIEW FROM CHAMBER ON SOUTH SIDE

PLATE No. 69

"ALL ON A SUNDAY MORNING"

THE HALLWAY.

SIMPLE WAYS AND MEANS FOR DECORATING THE HOME

1882. BOSTON.

By EDWARD DEWSON.

deep border about the edges (Fig 1). A few good examples of simple work are shown in the following *sketch, No. 2.* Such a floor is cleanly and healthful, requiring only the use of a damp cloth to keep presentable, and a joy forever during the annual season of spring cleaning. The ideal polished floor requires more constant and intelligent labor in bringing to perfection and keeping there, than the average housekeeper is able, from multiplicity of other duties, to give to it, and as we have no need to see our faces reflect from its glossy surface, we will put to one side the polished floor of palace and romance, and bring some more economical plan to bear upon it. Mr. Oakey, in his little book on "Building a Home," gives a receipt that may be of interest, although I cannot vouch for it from experience. I will give it here, he says: "Crude kerosene, a very cheap article, will be found to be the best application, administered once in ten days, with a cloth, the odor passes off rapidly, and the wood gradually assumes a real tone." A floor will last for years, with an occasional treatment of benzine and hot wax, applied with a large brush; it may also be filled, shellacked and rubbed down; but this last comes too near our "ideal" floor, and is too expensive to be of practical use here.

Experience leads me to believe the following method to be the best for our case in hand. The floor should be first well filled and oiled, and once in four months apply boiled linseed oil and wax, well rubbed on; this leaves a slight glossy surface, is easily kept in order and wears well, which are good points in its favor. To put down a hard wood floor, in an occupied house—since the invention of "Parquetry carpet floors," is not such an expensive luxury as one would be led to believe. These are made by machinery, of thin strips arranged in patterns on a canvas backing, making it about the thickness of ordinary carpeting. So, by first leveling off all uneven portions, this may be put down at prices ranging from $1.50 to $10 per yard. These floors wear well, are easily put down, and require no tearing up and relaying, which means dust, dirt and discomfort until the work is finished.

It is not always desirable or practicable to adopt hard wood floors, especially in hired houses, and in such a case, we have recourse to paint. Care should be taken when the color is medium or dark in tone that the first coat is very much the darker, gradually lighting up in succeeding coats, to the color required, This is so that scratches or nicks may not show light under, and furthermore, paint covers better with a light coat over a darker, as the light coat is apt to "grin" through in disagreeable, streaky way when the reverse is the rule. Three or four coats at most are sufficient, and in some instances two will answer. This depends on the amount of wear the floor will be subject to, and this point the judgment of the reader must decide. Care must also be taken that each coat dry thoroughly before the next is applied, also that too much oil is not used in mixing, as this will prevent its drying thoroughly or quickly. One or two coats of varnish, according to the exposure, will finish, allowing it to dry and harden well before using. Our floors may also be stained in imitation of cherry, walnut or other woods, and as many good receipts have already appeared in our BUILDER AND WOOD-WORKER, I shall not take up space by offering any here, for the present time at least, although later on I may do so. A border from four to six inches wide of a dark wood stain—walnut, for example, with a center of cherry stain, the whole finished with a thin coat of varnish makes a neat and pretty floor.

Here and there on the hall floor should be placed rugs, a large one for the main floor, and smaller ones where most desirable, never too many, as we should avoid a crowded appearance.

In the matter of rugs, I would suggest for looks, wear and economy, the well-known Philadelphia rugs. These are, as the name implies, a home-made article, and therefore free from the extra cost of duties, &c. The patterns are Persian in character, and of rich harmonious tones, with enough bright coloring introduced to give them a cheery look; the prices vary from two and one-half dollars to twenty dollars each, and as the patterns are the same on both sides, the rug is not injured, badly, by constant wear, for when too shabby may be turned. They can be obtained in almost any size and shape, and in tones to harmonize well with any good scheme of color decoration.

The stairway, whether finished in hard wood, painted or stained, should have a narrow strip of carpeting, of a plain dark tone, running the whole length, and finishing at the bottom with a small rug. A very pretty, although not a necessary addition, would be to hold the carpet in place by a small brass rod at the nosing of each step or tread, finishing the rods at the ends with a little brass ball or knob, screwed in place.

(*Will be Continued.*)

Stairs.

SECOND PAPER.

WHERE communication between the stories is frequent, the qualities necessary in the stairs are ease and convenience in using, combined with sufficient strength and durability. Economy of space in the construction of stairs is an important consideration. To obtain this, the stairs are made to turn upon themselves, one flight being carried above another at such a height as will admit of head room to a full grown person.

Method of setting out stairs where the building is already erected, or the general plan of the building is understood.

The first objects to be ascertained are the situation of the first and last risers, and the height of the story wherein the stair is to be placed. A sketch is made of the plan of the hall to the extent of 10 or 12 feet from the supposed place of the foot of the stair, and all the doorways, branching passages, or windows which can possibly come in contact with the stair from its commencement to its expected termination or landing are noted. The sketch necessarily includes a portion of the entrance-hall in one part, and of the lobby or landing in the other, and on it have to be laid down the expected lines of the first and last risers. The height of the story is next to be exactly determined and taken on a rod; then, assuming a height of riser suitable to the place, a trial is made, by division, how often this height is contained in the height of the story, and the quotient, if there be no remainder, will be the number of risers in the story. Should there be a remainder on the first division, the operation is reversed, the number of inches in the height being made the dividend, and the before-found quotient the divisor, and the operation of division by reduction is carried on, till the height of the riser is obtained to the thirty-second part of an inch. These heights are then set off on the story rod as exactly as possible. The next operation is to show the risers on the plan, but for this no arbitrary rule can be given; the designer must exercise his ingenuity.

When two flights are necessary for a story, it is desirable that each flight should consist of an equal number of risers; but this will depend on the form of the staircase, the situation and height of the doors, and other obstacles to be passed over or under, as the case may be. Try what the width of the tread will be by setting off, upon the line *n a* in Fig. 10, the width of the landing from the wall A B; and dividing the length of the flight into as many equal spaces as it is intended there should be steps in each flight. The landing covers one riser, and therefore the number of steps in a flight will be always one fewer than the number of risers. The width of tread which can be obtained for each flight will thus be found, and consistent with the situation the plan will be so far decided. A pitch board should now be formed to the angle of inclination; this is done by making a piece of thin board in the shape of a right-angled triangle, the base of which is the exact going of the step, and its perpendicular the height of the riser.

If the stair be a newel stair, its width will be found by setting out the plan and section of the newel on the landing (if one newel, it should, of course, stand in the middle of the width); then, in connection with the newel, mark the place of the outer or front string, and also the place of the back or wall string, according to the intended thickness of each. This should be done not only to a scale on the plan, but likewise to the full size on the rod. Set off on the rod, in the thickness of each string, the depth of the grooving of the steps into the string: mark also on the plan the place and section of the bottom newel; the same figure answers for the place of the top newel of the second flight, the flights being supposed of equal length. The front string is usually framed into the middle of the newel, and thus the centers of the rail, the newels, the balusters, and the front string range with each other; the width of the flights will thus be shown on the rod.

It is a general maxim that the greater the breadth of a step the less should be the height of the riser; and conversely, the less the breadth of step, the greater should be the height of the riser. Experience shows that a step of 12 inches width and $5\frac{1}{2}$ inches rise, may be taken as a standard; and if from this it is attempted to deduce a rule of proportion, substituting, for the sake of whole numbers, the dimensions in half-inches, namely, 24 and 11, then, in order to find any other width corresponding in inverse proportion,

Say as 24 : 11 :: 12 : 22
24 : 11 :: 19 : 13·8
24 : 11 :: 20 : 13·2.

Thus, it will be seen that a step of 6 inches in width will require the riser to be 11 inches, a step of $9\frac{1}{2}$ inches will need the riser to be nearly 7 inches, and that a step of 10 inches requires a riser of about $6\frac{3}{8}$ inches.

The same thing is thus otherwise expressed. Let T be the tread and R the riser of any step which is found to have proper proportion, then to find the proportion of any other tread t, and riser r,

$$\frac{R \times T}{r} = t, \text{ or } \frac{T \times R}{t} = r.$$

Take, for example, a step with a tread of 12 and a riser of $5\frac{1}{2}$ inches as the standard, then to find the breadth of the tread when the given riser is 8 inches, and substituting these values for t and r in the formula, we have

$$\frac{12 \times 5\frac{1}{2}}{8} = 8\frac{1}{4}$$

inches as the breadth of tread.

Suppose, again, the given breadth to be 13 inches, we have

$$\frac{12 \times 5\frac{1}{2}}{13} = 5\frac{1}{13}$$

inches as the height of riser.

This process of inverse proportion may be performed graphically as follows:

Let the tread and riser of a step of approved proportion be represented by the sides $c\,b$, $6\,a$, of the triangle $a\,b\,c$, Fig. 8. Through the point a, draw a line $d\,a\,f$, parallel to the step line $c\,b$. Then to find the riser for any other step, set off on the line $c\,b$, from the

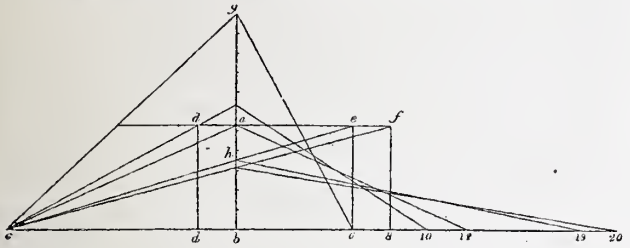


Fig. 8.

point c to d, the required width of a step, say 10 inches, and draw $d\,d$; draw also $c\,d$, and continue it to the line $b\,a$, and the point of intersection there will show the height of riser corresponding to the tread $c\,d$. In like manner, if the width given be 18 inches, set it off in the point 6; draw 6 e and $c\,e$, and the intersection at h will be obtained, giving $3\frac{3}{8}$ inches for the height of the riser. A width of 20 inches will show a height of 3·3 inches. On the right side of the figure is shown each step we have mentioned, connected with its proper riser, thus exhibiting the angle of pitch.

The same end nearly is arrived at thus: In the right-angled triangle $a\,b\,c$, Fig. 9, make $a\,b$ equal to 24 inches, and $b\,c$ equal to 11 inches, according to the previous standard proportion; then to find the riser corresponding to a given tread, from b set off on $a\,b$ the length of the tread, as $b\,d$, and through d draw the perpendicular $d\,e$, meeting the hypothenuse in e; then $d\,e$ is the height of the riser, and if we join $b\,e$, the angle $d\,b\,e$ is the slope of the ascent. In like manner, where $b\,f$ is the width of the tread, $f\,g$ is the riser, and $b\,g$ the slope of the stair. A width of tread, $b\,h$, gives a riser of the height of $h\,k$, and a width of tread equal to $b\,l$, gives a riser equal to $l\,m$.

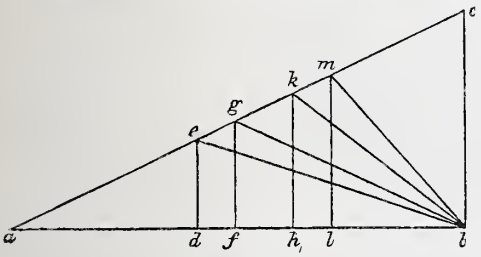


Fig. 9.

It is conceived, however, that a better proportion for steps and risers may be obtained by the annexed method:

Set down two sets of numbers, each in arithmetical progression; the first set showing the width of the steps, ascending by inches, the other showing the height of the riser, descending by half inches. It will readily be seen that each of these steps and risers are such as may suitably pair together.

It is seldom, however, that the proportion of the step and riser is exactly a matter of choice—the room allotted to the stairs usually determines this proportion; but the above will be found a useful standard, to which it is desirable to approximate.

In better class buildings the number of steps is considered in the plan, which it is the business of the architect to arrange, and in such cases the height of the story rod is simply divided into the number required.

Treads Inches.	Risers. Inches.
5	9
6	8½
7	8
8	7½
9	7
10	6½
11	6
12	5½
13	5
14	4½
15	4
16	3½
17	3
18	2½

Plans of Stairs.—Before giving examples of the various forms of stairs ordinarily occurring in practice, we shall with some minuteness illustrate the mode of laying down the plan of a stair, where the height of the story, the number of the steps, and the space which they are to occupy are all given.

The first example shall be of the simplest kind, or dog-legged stairs.

Let the height (Fig. 10) be 10 feet, the number of risers 17, the height of each riser consequently $7\frac{1}{17}$, and the breadth of tread $9\frac{1}{2}$; the width of the staircase 5 feet 8 inches.

Proceed first to lay down on the plan the width of the landing then the size of the newel a in its proper position, the center of the newel being on the riser line of the landing, which should be drawn at a distance from the back wall equal to the semi-width of the staircase, and at right angles to the side wall. Bisect the last riser $a\,b$ at o, and describe an arc from the center of the newel, as $o\,n$, on which set out the breadth of the winders: then to the center of the newel, draw the lines indicating the face of each riser. If there be not space to get in the whole of the steps, winders may be also introduced on the left hand side, instead of the quarter space, as shown.

The next example is a geometrical staircase.

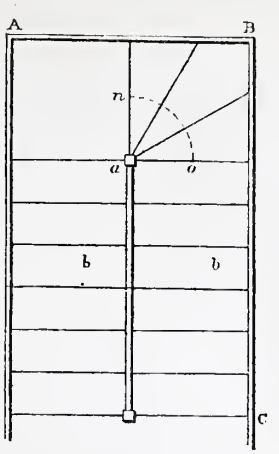


Fig. 10.

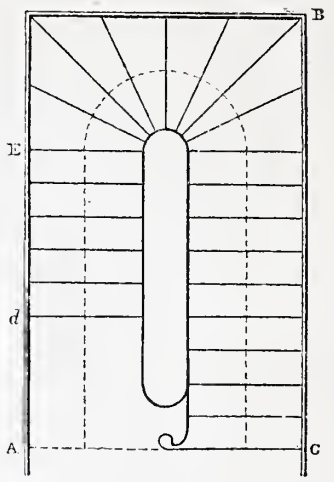


Fig. 11.

Let A B C D (Fig. 11) be the plan of the walls where a geometrical stair is to be erected, and the line C be the line of the face of the first riser; let the whole height of the story be 11 feet 6 inches, and the height of riser 6 inches, the number of risers will consequently be twenty-three. The number of steps in each flight will be one fewer than the number of risers, and according to the preceding rule the tread should be 11 inches, so if there are two flights there will be twenty-one steps; or if winders are necessary, there will be twenty-two steps in all, from the first to the last riser. Having first set out the opening of the well-hole, or the line of balusters, divide the width of the stairs into two equal parts, and continue the line of division with a semicircle round the circular part, as shown by the dotted line in the figure; then divide this line from the first to the last riser into twenty-two equal parts, and if a proper width for each step can thus be obtained, draw the lines for the risers. This would, however, give a greater width of step than is required; take therefore 11 inches for the width of step, and this, repeated twenty times, will reach to the line d, which is the last riser. There is in this case eight winders in the half space, but four winders might be placed in one quarter space, the other quarter space might be made a landing, and the rest of the steps being fliers, would bring the last riser to the line A C. The usual place for the entrance to the cellar stairs is at D, but allowing for the thickness of the carriages, the height obtainable there will be only about 6 feet, which is not sufficient. At E, in this example, would be a better situation for the entrance to the cellar steps.

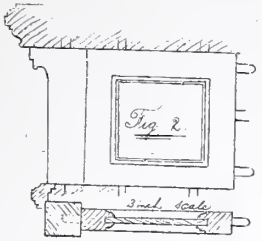
Measuring Lumber.

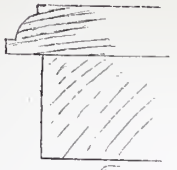
THE following tables for measuring lumber, 1 inch and $1\frac{1}{4}$ inch thick, have been in use in some of the most prosperous mills in the East, for a long time. We reproduce them here because some of our readers have asked for tables of this kind. The operator can adapt them to suit almost any lengths or thickness of stuff by dividing or multiplying.

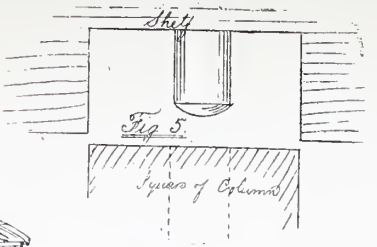
1 INCH LUMBER.

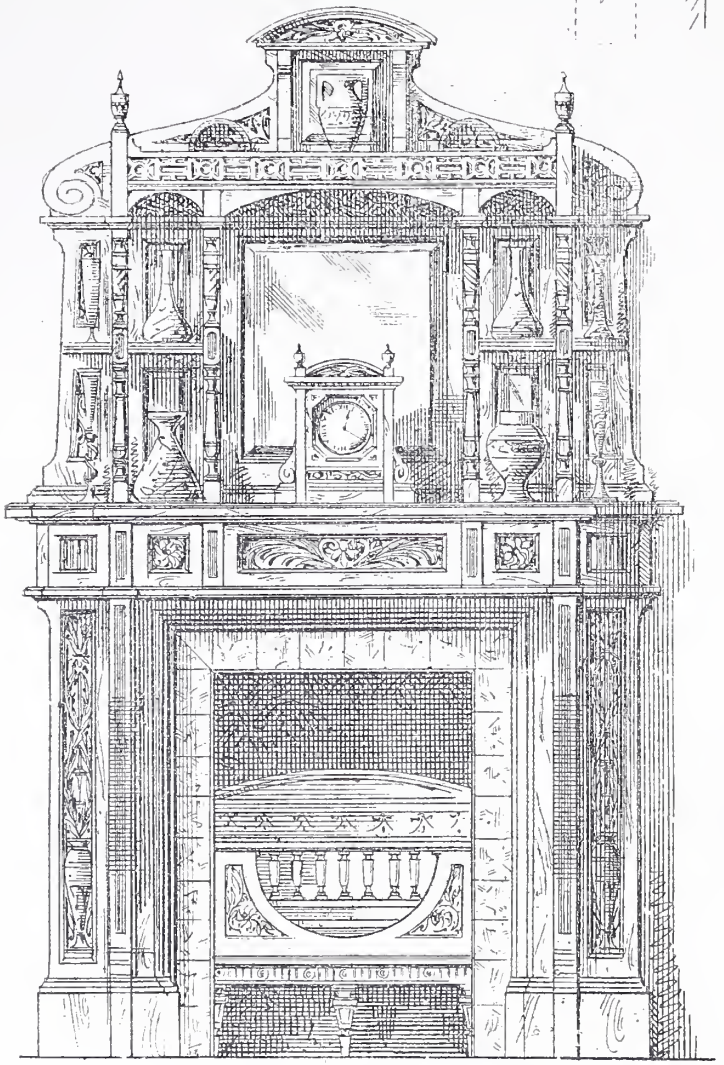
Length, ft.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.
	3	**3½**	**4**	**4½**	**5**	**5½**	**6**	**6½**	**7**	**7½**
12	3	4	4	5	5	6	6	7	7	8
13	3	4	4	5	6	6	7	7	8	8
14	3	4	5	5	6	7	7	8	8	9
15	4	5	5	6	6	7	8	8	9	10
16	4	5	6	6	7	8	8	9	10	10
17	4	5	6	7	7	8	9	9	10	11
18	5	5	6	7	8	8	9	10	11	11
19	5	6	7	7	8	9	10	10	11	12
20	5	6	7	8	9	9	10	11	12	13
21	5	6	7	8	9	10	11	12	12	13
22	6	7	8	8	9	10	11	12	13	14
23	6	7	8	9	10	11	12	13	14	15
24	6	7	8	9	10	11	12	13	14	15
25	7	8	9	10	11	12	13	14	15	16
26	7	8	9	10	11	12	13	14	15	17
27	7	8	9	10	12	13	14	15	16	17
28	7	8	10	11	12	13	14	15	17	18
29	8	9	10	11	12	14	15	16	17	18
30	8	9	10	12	13	14	15	17	18	19

PLATE No. 70

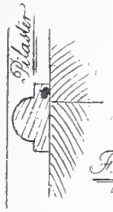


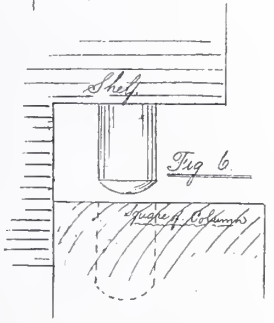


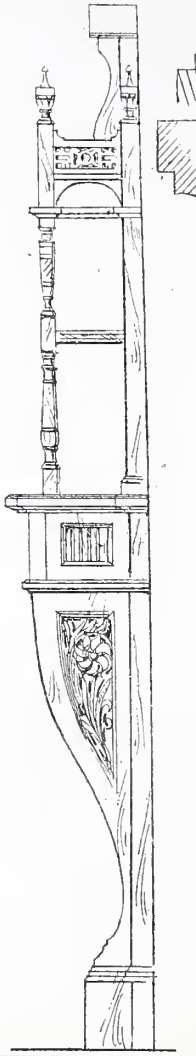


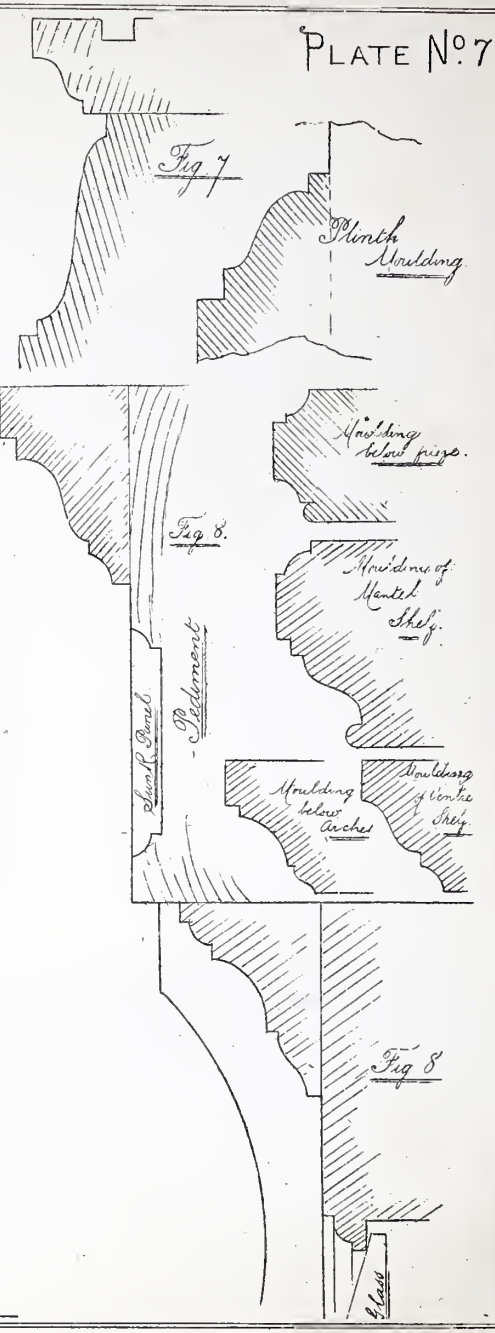


Original Design for Mantel, Queen Anne Style.







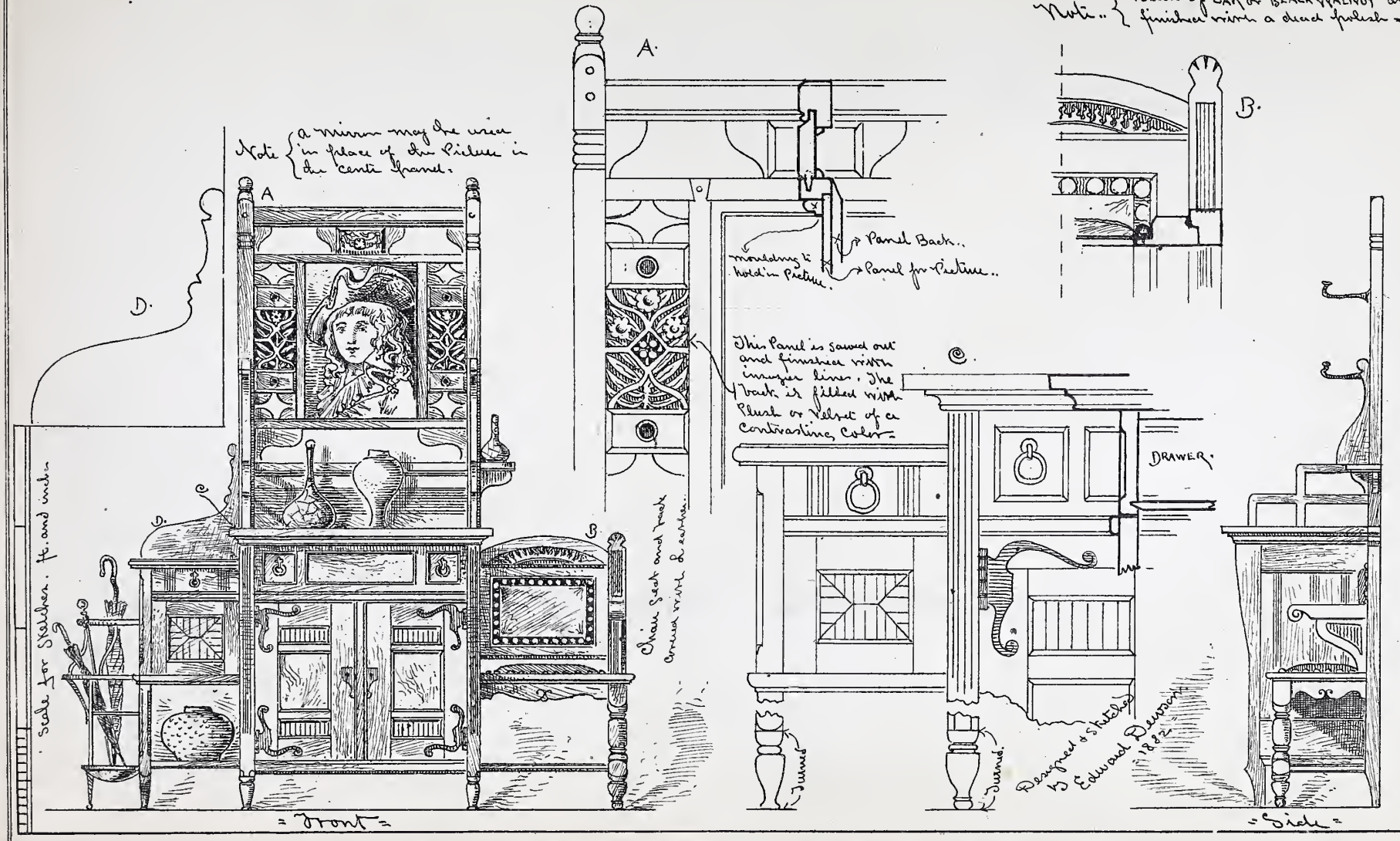


BUILDER AND WOOD WORKER.

"FREE WILL", SERIES.

A Simple Hall Stand and Details.

Note.. { Built of OAK or BLACK WALNUT and finished with a dead polish.



MEASURING LUMBER.—*Continued.*

1 1-4 INCH LUMBER.

Length, ft.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.	Width, in.
	3	3½	4	4½	5	5½	6	6½	7	7½	8
12	4	4	5	6	6	7	7	8	9	9	10
13	4	5	5	6	7	8	8	9	10	10	11
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18	6	7	8	9	10	10	11	12	13	14	15
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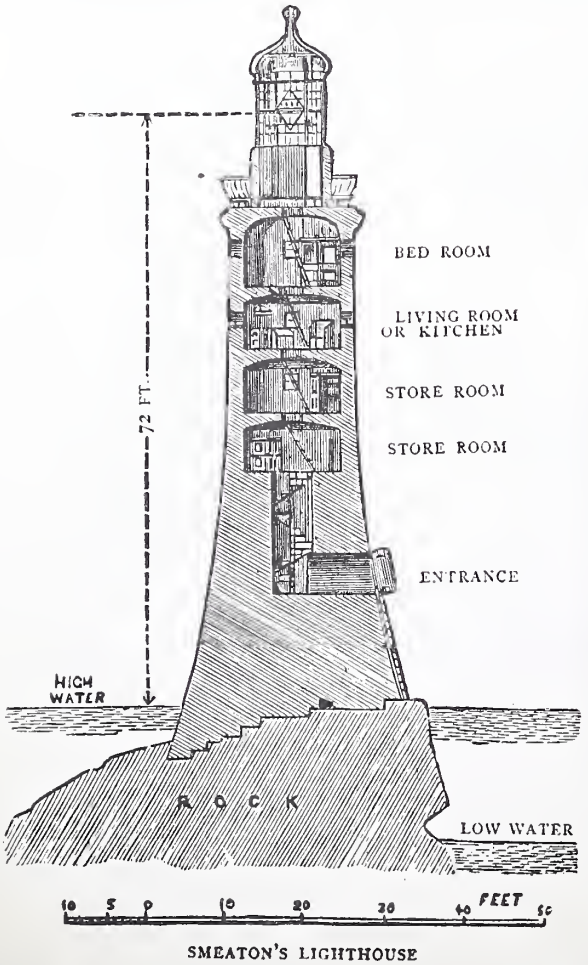
30	10	11	13	14	16	18	19	21	22	24	25

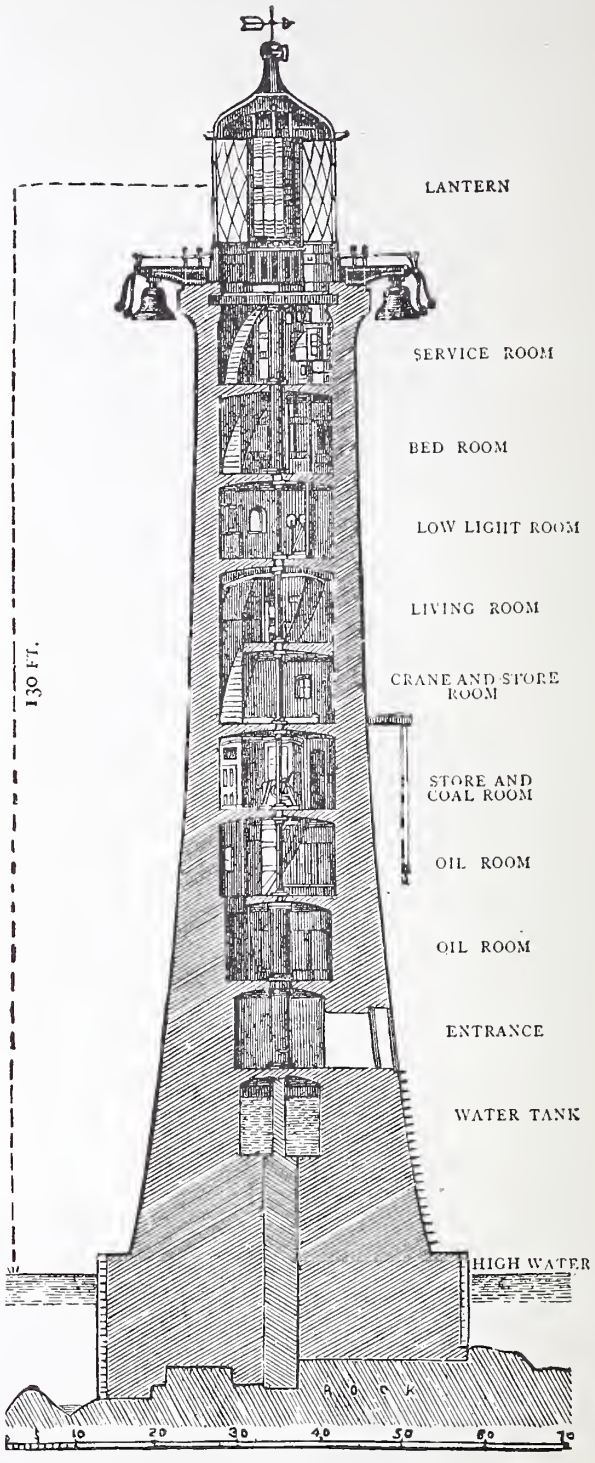
The Eddystone Lighthouse.

THE first lighthouse of this name that we have any account of was built by Henry Winstanley, in 1696. It was constructed of wood and stone, and was carried away, together with the architect and keepers, by a violent storm in November, 1703. A second, of similar construction, was built in 1708, by John Rudyard, a silk mercer, of London, and this was burnt down in 1755. The great engineer, Smeaton, then erected the famous tower, which has



SMEATON'S LIGHTHOUSE

stood for more than a century. It was discovered in 1877, that the rocky foundation on which the lighthouse was built, had been undermined to such an extent by the waves as to render it necessary to construct a new tower, though the old one was not at all impaired.



THE NEW LIGHTHOUSE

It was at first proposed to remove the Eddystone rocks completely when the Smeaton tower was condemned, as it was thought that this would render a lighthouse unnecessary. The Trinity Board, however, considered that it was not simply to indicate that there was a rock beneath its light, but was important as providing an essential link in the chain of channel lights. The new tower was, therefore, built under the superintendence of Mr. N. Douglass, and is essentially of the same character as Smeaton's, the different heights of the latter being as follows:

	Ft.	In
The six foundation courses	8	4¾
The eight courses to entry door	12	½
The 10 courses of well-hole to storeroom floor	15	2½
Hight of four rooms to balcony floor	34	4½
Total	70	

The new tower is 130 feet high, and is built entirely of granite. It may be of interest in this connection to state that a book, by

W. S. B., Waltham, Mass.—We understand from your sketch and description that the posts in the building are 10′ 8″ on centers, and that the girders, or floor beams, are 5′ 4″ on centers, and 22′ 6″ from end to end, the alternate beam being supported by a six-inch iron beam resting on top of the columns.

If this is the case your 8″x16″ hard pine girders will safely carry 26,000 lbs., or about 170 lbs. per sq. ft. of floor. The six-inch iron beam is loaded entirely its center, and a "trenton" beam of 50 lbs. per yd., and 10 ft. span, will safely support only 4,500 lbs. at the center, which would be only about 37 lbs. per sq. ft. of floor in your case. You should use a 12″ beam of 170 lbs. per yd., to utilize the full strength of your timber girders. The lower columns will safely support about 136 lbs. per sq. ft. on the second, third and fourth floors, and fifty lbs. per sq. ft. on the roof, all at the same time. They will probably never be loaded to such an extent, however. You will find all necessary information for computing the strength of floors in Mr. Kidder's articles on the Mechanics of Architecture, published in the BUILDER AND WOOD-WORKER for April and May, 1881.

D. L. N., Buffalo, N. Y.—We have answered your questions on several occasions, but as the "blue printing process" of copying tracing, seems to be a subject of general interest, we again give a detailed description of the method as practiced by some of our best draftsmen.

The following, which is taken from the *Locomotive*, covers the whole ground :

The materials required are as follows :

1st. A board a little larger than the tracing to be copied. The drawing-board on which the drawing and tracing are made can always be used.

2d. Two or three thicknesses of flannel or other soft white cloth, which is to be smoothly tacked to the above board to form a good smooth surface, on which to lay the sensitized paper and tracing while printing.

3d. A plate of common double-thick window glass of good quality, slightly larger than the tracing which it is wished to copy. The function of the glass is to keep the tracing and sensitized paper closely and smoothly pressed together while printing.

4th. The chemicals for sensitizing the paper. These consist simply of equal parts, by weight, of citrate of iron and ammonia, and red prussiate of potash. These can be obtained at any drug store. The price should not be over 8 or 10 cents per ounce for each.

5th. A stone or yellow glass bottle to keep the solution of the above chemicals in. If there is but little copying to do, an ordinary glass bottle will do, and the solution made fresh whenever it is wanted for immediate use.

6th. A shallow earthen dish in which to place the solution when using it. A common dinner-plate is as good as anything for this purpose.

7th. A brush, a soft paste-brush about four inches wide, is the best thing we know of.

8th. Plenty of cold water in which to wash the copies after they have been exposed to the sunlight. The outlet of an ordinary sink may be closed, by placing a piece of paper over it with a weight on top to keep the paper down, and the sink filled with water, if the sink is large enough to lay the copy in. If it is not, it would be better to make a water-tight box about five or six inches deep, and six inches wider and longer than the drawing to be copied.

9th. A good quality of white book-paper.

Dissolve the chemicals in cold water in the following proportions : 1 ounce of citrate of iron and ammonia, 1 ounce of red prussiate of potash, 8 ounces of water. They may all be put into a bottle together and shaken up. Ten minutes will suffice to dissolve them.

Lay a sheet of the paper to be sensitized on a smooth table or board ; pour a little of the solution into the earthen dish or plate, and apply a good even coating of it to the paper with the brush ; then tack the paper to a board by two adjacent corners, and set it in a dark place to dry ; one hour is sufficient for the drying ; then place its sensitized side up, on the board on which you have smoothly tacked the white flannel cloth ; lay your tracing which you wish to copy on top of it ; on top of all lay the glass plate, being careful that paper and tracing are both smooth and in perfect contact with each other, and lay the whole thing out in the sunlight. Between eleven and two o'clock in the summer time, on a clear day, from six to ten minutes will be sufficiently long to expose it ; at other seasons a longer time will be required. If your location does not admit of direct sun-light, the printing may be done in the shade, or even on a cloudy day ; but from one to two hours and a half will be required for exposure. A little experience will soon enable any one to judge of the proper time for exposure on different days. After exposure, place your print in the sink or trough of water before mentioned, and wash thoroughly, letting it soak from three to five minutes. Upon immersion in the water, the drawing, hardly visible before, will appear in clear white lines on a dark blue ground. After washing, tack up against the wall, or other convenient place, by the corners to dry. This finishes the operation, which is very simple and thorough.

REVIEWS OF TRADE LITERATURE.

WE are grieved to announce the fact that the *Penn Monthly* closed its career with the July issue. The *Penn Monthly* was an able, calm and dignified journal and will be missed by many of the most advanced thinkers of this country.

Brick, Tile and Metal Review.—This excellent journal comes to us regularly brim full of the best and most reliable information concerning the interests it represents. The last issue contains a very useful article on the burning of bricks, and another one on the chemistry of earth. It seems to us that the intrinsic value of the journal and its low price should induce every person who has anything to do with brick, metal, or tile, to keep a copy of it regularly on his table. Price, 50 cents per annum. Published by Geo. E. Williams, 90 Diamond street, Pittsburgh, Pa.

Forest and Stream —With the first issue in August the popular New York journal, *Forest and Stream*, has been enlarged to 28 pages, weekly. The *Forest and Stream* is devoted to angling, shooting and yachting, and kindred out-of-door manly recreations. It is one of the most remarkable journalistic successes of the day, having an excellent corps of contributors, and a wonderful circulation all over the country. In appearance, size, and quality of contents, the paper is a model, and deserves all the credit it has won. It is published by the Forest and Stream Publishing Co., 39 Park Row, New York City.

"The Annals of a Baby," by Sarah Bridges Stebbins, is one of the brightest and best books of the day, and everybody should read it and enjoy its exquisite humor and telling pathos. Poetic in the highest degree, it depicts in glowing tints a series of home scenes, in which, of course, the baby is the central figure. These scenes, and the various characters taking part in them, are so natural and so felicitously drawn that the reader cannot resist the fascination they exert, and this fascination holds sway until the last. The Baby is a charming little atom, and the good it does simply by its presence is described in a manner that reaches at times the height of the pathetic. There is a delightful flutter of excitement attending the naming of the Baby, and the Baby's party is as comical an affair as ever an author put on paper, and is so original and novel that no one can fail to be pleased with it. Then the Young Mother, with her kindness and thoughtfulness, the Young Father, the Young Aunties, the Grandfathers, the Grandmothers, the Poor Relation, the Crippled Sister, the Fat Nurse and Aunt Hannah at once photograph themselves on the mind and become, so to speak, living personages whom everybody can understand and appreciate, the Fat Nurse, with her quaint language and practical ideas, being a creation worthy of Dickens. The chapter called "The Sunset of Life" will bring tears to many an eye, and that devoted to Aunt Hannah will sink deeply into every mother's heart. No better or more interesting work of the kind can be found, and it is cordially commended to everybody, especially those who have read and admired "Helen's Babies." Published by T. B. Peterson & Brothers, Philadelphia. Price, cloth, $1.

Great Artists of the American Stage, by Alfred Trumble. Published by R. K. Fox, 183 William street, New York. Price 50c. A handsome volume, containing twenty-nine fine portraits of popular players, male and female, with vivid and authentic biographical sketches by a well known dramatic journalist of New York ; it cannot fail to achieve a place for itself not only in popular favor but among the most valuable literature of the stage. In presenting the first installment of this series the author and publisher have opened a vein which will yield both fame and profit.

The Manual Element in Education. By John D. Runkle, Ph. D., L.L. D., Walker Professor of Mathematics, Institute of Technology, Boston, Mass.

To those who are interested in the industrial development of this country, and who desire to know how technical education is imparted to future artisans in some portions of the old world, this pamphlet will prove instructive and profitable. We shall take occasion next month to make a few pertinent extracts from this paper, in order to show the immense importance of the Manual Element in Education.

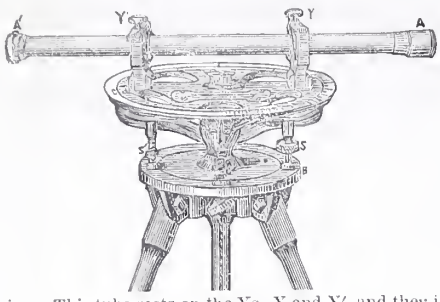
PUBLISHERS' COLUMN.

☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

THE difficulty of removing old paint has been a source of trouble and annoyance to every one who has had anything to do with cleaning and repainting old wood work, or painted machinery or other iron work. It is true that there have always been means of removing old paint, in a way, but these means have been so primitive and troublesome, or so injurious to the wood-work, or the subsequent coats of paint, as to render their adoption practically out of the question. The new "Electric" Paint Remover, however, prepared by A. E. Rendle, No. 7 Warren street, New York, meets all the necessary requirements, and removes paint, grease or other like substances, effectually, and without labor, and leaves the work in the best of condition for repainting, polishing or staining. We have tried the "Remover" and therefore "speak by the book," and can say without hesitancy, that there is nothing in the market in the shape of a "paint remover" that will give anything like the satisfactory results that Rendle's preparation does. Its action, though chemical, is perfectly harmless to the surface of either wood or metal, and its difference to other "removers" is that subsequent applications of paint, varnish or polish is not affected by it. Its application is simple, no scraping or erasing is required. It is applied with a brush, left for a half hour, then washed with a sponge or cloth and cold water. The result is marvelous.

Send for circular.

WE give herewith a description of the new LEVEL and Rod manufactured by Wm. T. Comstock, 6 Astor Place, N. Y. The letters refer to corresponding letters on the cut:



The sighting tube A A′ is 14 in. long and has at the end A a pin hole looking through the tube, and at the other end A′ a small ring inside the brass shield or outer ring shown in cut holding the cross wires. These wires are adjusted to the center by the little screws whose heads appear in the drawing. This tube rests on the Ys, Y and Y′, and they in turn stand on the inner circle C′. On this tube at the Ys are two rings with flanges, like car wheels, and it is held in its place by the latches on the top of the Ys, which again are fastened in position by the thumb screws appearing in the cut on top of Ys. By loosening these latches this sighting tube may be revolved to test the adjustment of the cross wires.

At the foot of Y′ and beneath the inner circle will be seen the head of three screws marked r in the cut which may be turned by a key furnished with the instrument, thus raising or lowering the end of the tube and adjusting the line of sight to the line of level of the circles. The horizontal circles C and C′ are two concentric circles revolving one inside the other. The outer circle is graduated to degrees and the inner marked at every 45°, so that the instrument may be used in laying off angles, squaring foundations, &c. The inner circle (C′) carries the glass bubble which is seen in the cut level with the top surface of the plate. The bubble itself may be adjusted by a screw beneath the brass plate protecting the glass. In the center of this circle will be seen the head of the screw which binds the different parts of the instrument together and which forms the axis about which the circles revolve. This

screw goes into the shank of the ball which appears in the socket of the base, the upper part of which is shown in the cut. The outer circle forms a support and guide for the inner circle, and to its spokes are attached the two thumb screws and springs opposite to them by means of which the instrument is brought to a level.

The base B is simply a solid disc with a smoothly turned outer rim on which the little cups holding the feet of the screws and springs may slip easily whenever it may be necessary to revolve the outer circle on the base. The center of this disc is formed into a socket for the ball referred to above. The under surface of this disc has a solid cylinder which sets in the collar of the tripod and is held firmly in its place by means of a stud and set screw. The center screw and shank of the ball are hollow, so that the cord suspending the plumb-bob may be passed up through the instrument, and is held in its place by the knot in the cord as shown in the cut. From this description it will be seen that this instrument can be adjusted in every way possible in the highest priced instruments, and has besides the additional feature of a horizontal circle, making it in reality a plain transit, as well as a level.

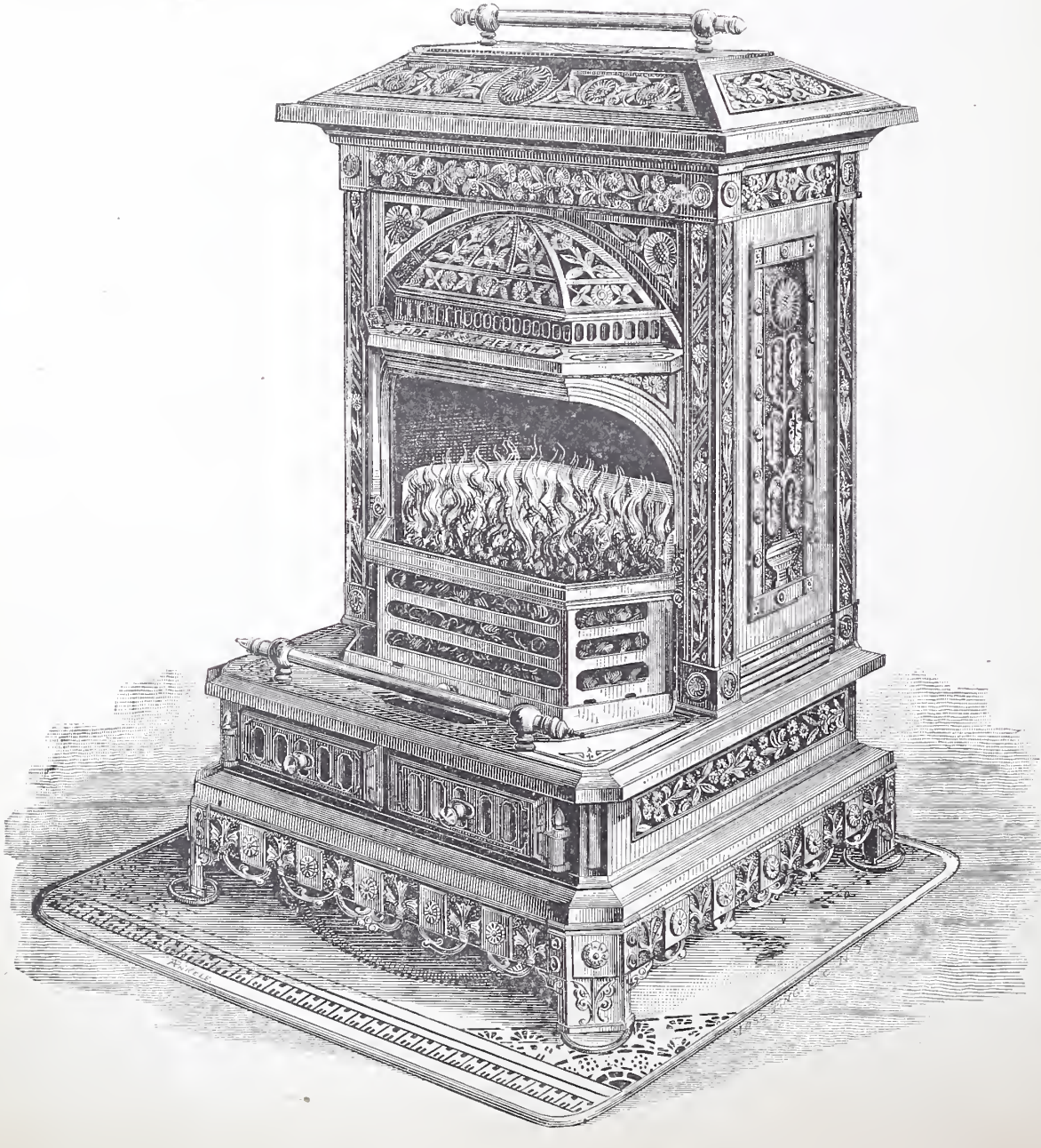
The leveling rod is round and made in two sections, so that it can be conveniently carried, is united by a solid screw joint, so that when together it is as firm as if of one length, and has a target as shown in illustration, made to slide on the rod.

There are two scales: one side being engineers' (feet, 10ths and 100ths); the other architects' scale (or, feet, inches, and 8ths). This rod will be found by engineers light and convenient, and well worth its price as a second rod where they have one of the ordinary make. To architects and builders it will be invaluable, as it gives them the measurements in feet and inches.

BOUND volumes of the BUILDER AND WOOD-WORKER for 1881, can now be obtained from this office Price $2.50.

ANY one having a complete set of "Knight's Mechanical Dictionary" for sale, cheap, may find a purchaser at this office

SEND seventy-five cents to this office for a copy of the "Steel Square and its uses." The best Book for young workmen, in the market.



We have on former occasions spoken in high terms of our experience with the Stoves and Air-warming Grates made by The Open Stove Ventilating Co. of this city, and in this issue we present a cut showing the appearance of their new No. 18, which makes quite a significant departure in Stove architecture.

The patterns have all been modeled in clay by a first-class artist, thus enabling the manufacturers to produce castings of extraordinary beauty and character, which, taken together with the well established sanitary and economical advantages of the Fire on the Hearth apparatus (Stoves, Air-warming Grates and Fire Place Heaters), makes it probably the most attractive and desirable Stove ever made for warming and ventilating dwellings.

For the benefit of those of our readers who have never had an opportunity to examine personally into the merits of this apparatus, we briefly state that each form or variety combines within itself the ventilation of an open fire with the air circulation of a furnace, and to meet any severe emergencies of temperature it may instantly be converted into a close heater, with great power.

THE BUILDER & WOOD WORKER

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N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, 176 *Broadway, New York, to whom all letters of a business character should be sent.*

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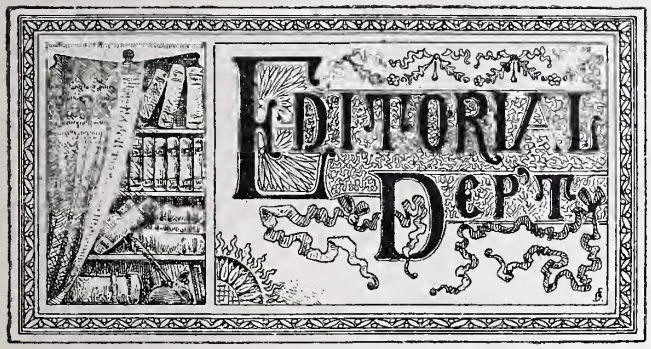


A RELIABLE English exchange, *The Journal of Decorative Art*, in discussing the evils of sewer gas, calls the attention of householders to the fact that it is easy to discover its presence by utilizing the fact that it acts upon white lead paint in such a manner as to dissolve it; and remarks that "the test can be rendered complete and effective, if a portion of the woodwork were painted with silicate paint the same shade; because, resisting as it does the action of the gas, it would serve to emphasize more strongly any discoloration that might take place. As an experiment we would suggest disks being made and painted pure white with white lead paint, and across the center a band of white, of silicate or 'Charlton White' painted on them, these hung up in the bath room, w. c., or cellars, or in such places as are suspected of being inlets for sewer gas, would soon discover if there was any such gas present, and disclose the danger at once. We are glad at being able to thus draw the attention of the trade to an important scientific fact, of which for years they have been the unconscious demonstrators, and to place them where their position properly is, amongst the front ranks of sanitary reformers."

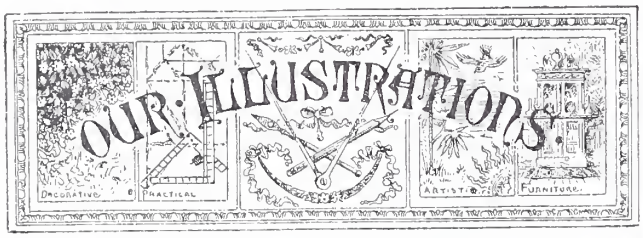
The experiment suggested is simple and inexpensive and, no doubt, effective. Doubtless, sewer gas has killed thousands, and rendered life miserable to many other thousands, but it must not be thought for a moment that all the nameless ills to which human flesh is heir are caused by sewer gas. It is deadly enough certainly, but it is hardly right when made use of to cover professional ignorance.

A SHORT time ago the American Congress of Forestry met in Montreal and a large number of interesting and instructive papers were read on the best way to conserve existing forests; on climatology and forestry; forests in their relation to water supply; how to promote the extension of timber bearing lands in districts where timber is scarce, and how best to introduce it into the treeless regions of the West, as well as on a number of other subjects bearing on this important matter. The preservation of our forests is a matter that has been too long neglected. Public health and the preservation of our present climatic condition demand that something should be done and done quickly to stop the destruction of our forests. After all, the cost of tree planting is so trivial that, if the importance of this matter were brought before the public, they would doubtless do much to assist in this matter by planting more shade trees about their houses, along the country roadsides, and wherever land was available for this purpose. So important is this matter that we are almost persuaded to invite legislative action on the subject. Some laws ought to be devised—and enforced—to prevent the present destruction of trees, and to encourage the planting of young timber.

AMONG the most notable pieces of architecture in New York must hereafter be mentioned Theiss' Music Hall, on East Fourteenth street. Were it not that lager beer flows there as freely as music, we should have to speak of it as a weird as well as a wonderful place. As it is, one can see, and it is richly worth going a hundred miles to see, what an artist architect can do when given time and money. Mr. Arthur Crooks has fairly outdone himself. He was given a difficult architectural problem to solve, as regards general design, to fit a place for its uses, and then he set about making it beautiful. The Hall must be judged in its entirety, as a whole. Mr. Crooks designed, and decided, every bit of detail, selecting every color in tiles and decoration. The decoration was done by Mr. Cohn, who was assisted by Mr. Rattray, formerly of the BUILDER staff, and whose panels in their exquisite freeness are worth hours of study. The decoration throughout shows master hands, and reflects the highest credit to all the parties connected with it. The stained glass work by Mr. Kirtland is especially fine. Mr. Crooks has just reason to be proud of his work.

THERE are some men in this world so mean that we wonder at their being recognized as men at all. A short time ago a person opened a hotel at Seabright, a watering place on the New Jersey coast, and straightway bid for a share of public patronage. The place seems to have been fairly patronized, and everything seemed to be going along swimmingly, when all at once two of his guests were stricken with typhoid fever, which, as soon as known by the other visitors, caused a stampede. Now, this state of affairs was not at all pleasing to the proprietor, and he immediately announced that he would close the establishment, and that the stricken victims must remove to other quarters. The physician in attendance remonstrated with the landlord, and represented that a removal would likely prove fatal to the sufferers. The representation made no difference to the obdurate hotel man, he still insisted on the removal. His heart was softened, however, by the receipt of five thousand dollars for "expenses"

from the friends of the relatives. It was afterwards put in evidence before the Board of Health which investigated the matter that some of the closets could not have been flushed for six or more weeks, as the tank on the roof which held the water for this purpose was said to have been empty for that length of time, and the lavatories were found foul and in a bad condition. Under the circumstances we cannot arrive at any other conclusion than that the man who runs that hotel at Seabright is about as mean a specimen of a kind as can be conceived; and we are not sure but the fellow can be forced to disgorge the $5,000, and a nice additional sum for damages; for if all is true as presented before the Board of Health, the cause of the illness of the two guests was directly traceable to the filthiness of parts of the building at which they stopped, said filth and dirt being entirely due to the negligence or cupidity of the landlord. At any rate, when a man opens a place of resort like that in question, he is supposed to take all risks, and has no right to insist on the removal of persons who may be taken ill at the resort, providing the disease is one that is not likely to become epidemic. How much more is he to blame if he insists on a removal when the cause of the disease is traceable to his carelessness?



On Plate 73 we show elevations and plans of a low-priced cottage, one that we think might be built and furnished complete for about $1,600. We are indebted to Mr. Geo. O. Woodcock, Claremont, N. H., for the drawings.

On plate 74 we show two elevations of a comparatively inexpensive Chapel, suitable for many summer resorts, where the principal requirements are, to build a roomy and well ventilated place of worship at a small outlay. As will be seen, the lower portion of the tower serves as an open vestibule, on one side of which is a platform for alighting from carriages. Above there is an octagon shaped belfry, which finishes off pleasingly in a rounded cap.

The general design is intended to be in keeping with the prevailing popular style of rural architecture, without wandering from ecclesiastical principles.

The seating capacity is about 350, and the cost, complete, $4,500.

The plans were prepared by Fred'k C. White, architect, of Princeton, N. J.

Plate 75 shows a church with plan. This plate is furnished us by S. M. Howard, of Wheeling, Va.

Plate 76 represents an interesting cabinet, by Mr. Dietrich, simple in construction, and not beyond the reach of amateurs.

Plate 77 shows another of those plates of scale elevations and details that are furnished to the Builder and Wood-Worker by Mr. Edward Dewson. These are excellent plates for the amateur and general workman.

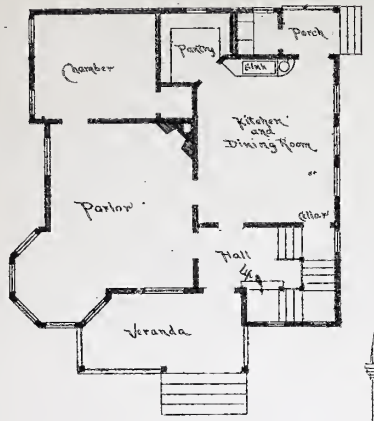
On Plate 78 we show a design for room decoration, taken from the "*Journal of Decorative Art.*"

"The cornice and frieze about one foot, measuring vertically, and the dado, four feet from the floor to the top of the border, the skirting occupying fourteen inches of this space. The cornice is composed of a narrow flat or frieze, a cove or hollow, and various moldings; the cove and frieze have stenciled ornaments upon them. The wall space upon which the pictures hang occupies about five feet ten inches. There is no absolute rule as to the height of the dado; it might with propriety be only a few inches above the height of the chair backs. A good guide is to take the height of the top side of the lock rail of the door, and make the dado the exact height of that. But if there are children in the house it is always wise to get higher with it, in order to prevent finger marks. We would draw special attention to the fact that the whole of the ornament displayed on this design has been actually executed with stencils, in this wise: The design was first drawn three times the size as here shown, and stencils cut for all borders, panels of doors, dado, etc., and stenciled on to the design, some of the ties on the door panels being afterwards filled up. The design was then reduced by photo-lithography to its present size. The dado pattern is a conventional arrangement of the lily, entirely original, as indeed are all the other ornaments. The door panels represent the four seasons. The primrose for spring, the rose for summer, the poppy, wheat-ear, and blackberry for autumn, and the holly and mistletoe for winter. With regard to the coloring for this design, it may be done in a variety of styles, and will, of course, be governed by the particular circumstances of the room to which it may be applied. These conditions depend upon what the room is used for, its aspect, whether it faces east, west, north, or south. All these are circumstances which should, and in fact must, have a bearing upon the coloring of the room. It is a self-evident fact that if it is a room into which the sun shines most part of the year, it would have to be treated in a different manner to one into which the sun scarcely ever comes. In the latter case we should require warmth and light in the coloring, while the former would require to be cool and quiet in tone, so as to modify the glare and heat of the sunlight. These are, however, matters we shall fully enter upon in due time. It may suffice here to indicate one or two ways in which this design may be treated. For a room of the size here represented it would always be safe to use quite neutral colors. If it has a northern aspect we would use a salmon color for the wall space, warm cream color for the ceiling, and two shades of neutral green for the dado, the latter color being made from green, white, and sufficient venetian red and umber in it to modify the green and make it into a dull, warm, neutral color. The pattern of the dado to be stenciled on in a darker shade of the same color. The border on top of dado would be best stenciled upon the wall color, and may be in the same colors as the dado pattern. In coloring the cornice, we should have portions of the moldings left white. The bottom flat or frieze should be done the same color as the flat of ceiling, and the ornament stenciled in a lighter tint of the same color as the border at top of dado. The cove or hollow of cornice should be done in with a color made from the salmon color and ultramarine blue, and the ornament stenciled upon it with the same color made much warmer with Indian red.

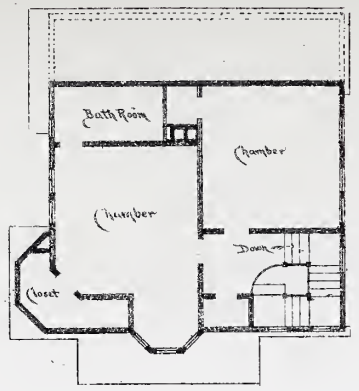
"We have now to consider the color of the woodwork. Persons of quiet tastes might have the panels of the door done same as the ground color of the dado, and the stiles of the colors of the stencil, with moldings picked in, in the different tints used in the room. In this case we should stencil the ornaments on the panels with the stencil color used on the dado, and outline them with a darker color of the same, having a little Indian red and black mixed with it; this, with the addition of a little gold upon the beads of moldings next the panels and on the architraves would make a quiet and good looking style of doing it. Or the work may be grained and the ornament stenciled in black upon it. Another way of doing the woodwork would be by painting it in low toned colors, such as warm golden browns with moldings black and gold and ornament stenciled in black."

On Plate 79 we show designs for two bookcases. The designs are by B. J. Talbert, and are reproduced from

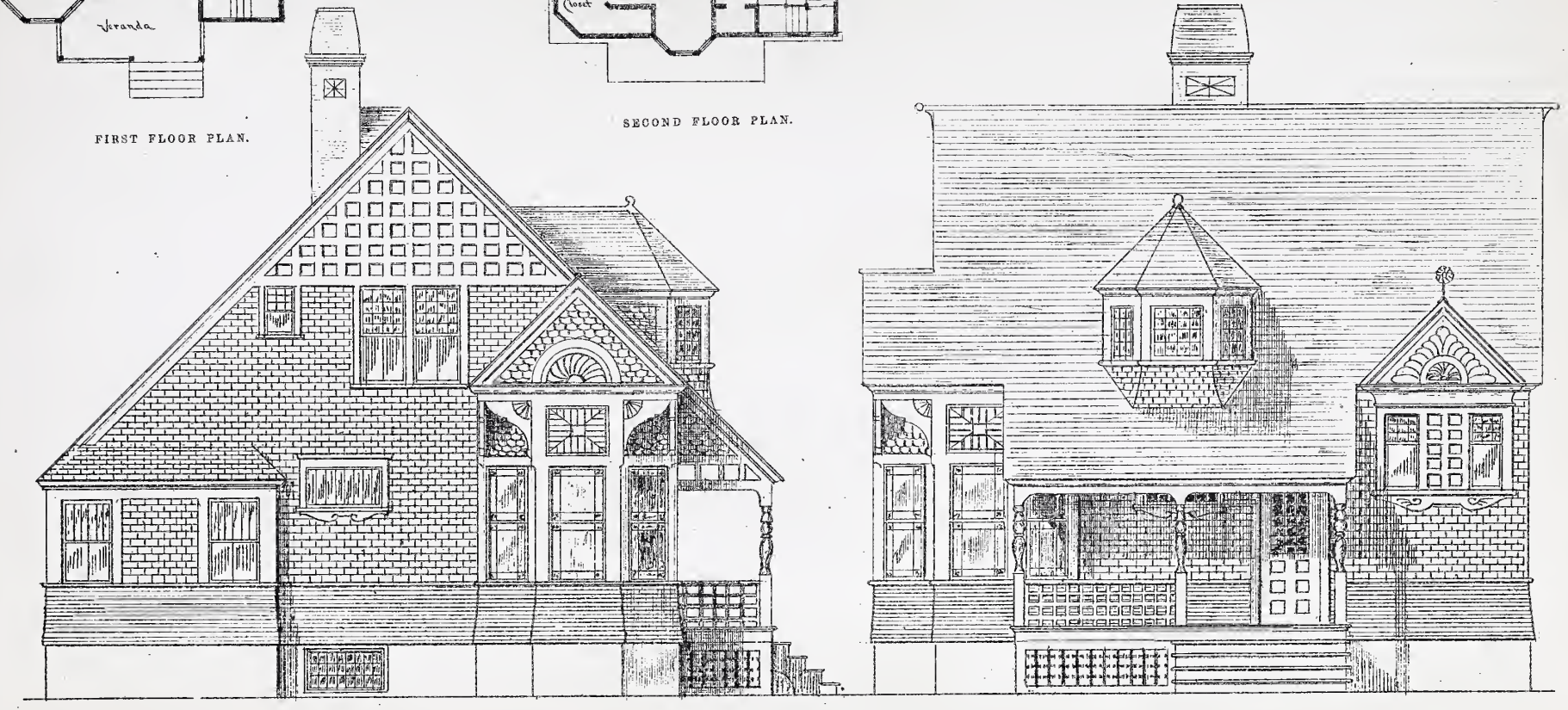
Reduce to 4" scale



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.



A COUNTRY COTTAGE.

GEO. O. WOODCOCK, ARCHT., CLAREMONT, N. H.

the *Cabinet-Maker and Art Furnisher*, London, from which we take the following in regard to the designs:

"The library is an apartment which does not receive the attention at the hands of our designers that is bestowed upon other rooms in our houses. There is, however, great scope for ingenuity and design in the 'bookworm's paradise,' as the sketches on page 234 may indicate. The combined sideboard and bookrack at the top of the page is interesting because it exemplifies the style in which Talbert first made a reputation—viz., domestic Gothic. He was the designer who first applied Gothic to domestic furniture in a satisfactory manner, and some consider his book on 'Gothic Forms, as applied to woodwork' the most valuable of all his publications. Every previous attempt at Gothic furniture by Pugin and others had been too architectural, and it was left for the then young Scotchman to show how the ecclesiastical style could be reduced to homely purposes. Thus Talbert paved the way for a return to the thoroughness and solidity in furniture now so prevalent. We do not much admire Gothic in any form for domestic furniture, it is almost invariably so cheerless and clumsy, but if it is to be tolerated at all, the library is the apartment for it. The quaint specimen we thus publish and notice may serve as a keynote to our designers who believe in Gothic for the library. The useful little secretary bookcase below the foregoing, is in that style which Talbert founded, vulgarly known as 'Early English.' The conveniences embodied therein may be left to speak for themselves, and the pattern will, we think, at once commend itself to those looking for something uncommon and artistic. Where price will allow, the panels left plain in the sketch are intended to be enriched with a little carving in low relief. Some natural foliage conventionally treated might be introduced into the lower panels, and in the one above a bas-relief of a literary sage, such as Dante or Shakespeare, would give character to the article. Oak or black walnut are the most fitting woods for this Talbert bookcase."

Plate 80 is in connection with the articles on stairs, to which the reader is referred.

Suggestions to Students of Architecture.

BY C. FRANCIS OSBORNE, PROFESSOR OF ARCHITECTURE IN CORNELL UNIVERSITY.

THE frequency of the communications in the columns of the BUILDER & WOOD-WORKER for advice in regard to the proper course to be pursued by young men who contemplate fitting themselves for the practice of architecture, has lead me to think that a few notes on the subject of a general course of study leading to the desired end might not be unacceptable. The writer has had the privilege of advising in not a few such cases, and has reason to believe his advice has borne good fruit.

It is the result of his experience that the chief difficulty in all such cases arises from a misunderstanding of the true nature of the profession which it is intended to adopt; and so it would be best, perhaps, to have a clear understanding of what it is an architect's duty to know, before proceeding to discuss the best way of acquiring such knowledge.

Now an architect is evidently one who is qualified to practice architecture, or, as it is better expressed, *the art of good building*; and as to what the latter is, I think the definition of Sir Henry Wotton is the most concise and best suited to our present inquiry. "Well building," said he, "has three conditions: fitness, firmness, and fairness"—the three F's, it might be said, of the profession, each an equally important factor of a complete whole. That is to say, in order to build well (and no architect could care to do otherwise), we must build so that our work shall be:

(1) Convenient, *i. e.*, fitted to its use;
(2) Firm and stable; and,
(3) Fair, *i. e.*, pleasing to the mind.

Such then is architecture, and such must be the scope of the architect's knowledge, in order that he may be duly qualified to practice his profession.

Now that he may build *fitly*, he must have learned, from study and experience the habits of men in the various conditions of human life; and that he may be prepared to properly design such buildings as are usually allotted him, he must have observed and studied his fellow beings in their home life; in their education; in their various occupations; in their public worship; in sickness and in health; and in all the other accidents of their existence. He must be able to sympathize with all conditions of them both as individuals and as communities, and so be able to provide them with buildings wherein they may pursue their various vocations; which buildings shall, by reason of his knowledge so acquired, be thoroughly well fitted to their various uses. In order that he may build *firmly*, he must know, as far as may be, the qualities and characteristics of the various materials which he will use in his work. He must know their relative fitness for different purposes, and what are the best means of using them under the varying conditions which arise incident to his practice. And he must be able to calculate the effect of such new arrangements of his materials as he may find it necessary to adopt in special cases, together with the best methods of combining these materials in all the usual constructions: such knowledge not only enabling him to meet properly the requirements of any given case, but serving as well to give him that confidence in the result which all practitioners should have. And in order that he may build *fairly*, that he may please the eyes of his fellow-men—and so in some measure compensate them for that portion of the earth and sky which his buildings shall have obliterated from their sight—he must learn the laws of design, which are founded, as all laws should be, on principles of truth and justice. He must study the designs of other men and other ages, that he may learn from them how best to carry out those laws in a fitting manner, and how best to avoid those many departures from them with which the course of the history of design is so lamentably disfigured. And finally, he must possess the knowledge and skill so to put down upon paper the results of his studies in all these matters, that he may enable his workmen to carry out his designs according to his true intention. A long and seemingly formidable course of study, but one which can and must be mastered ere any man may, in justice, write himself "architect"—*chief builder*.

Now as to the best way of acquiring this knowledge. It is always well, of course, to advise in such matters in accordance with the needs of each individual case, since it is difficult to lay down any general plan equally well suited to all students. But to the end that the suggestions here made shall be applicable to the largest possible number of cases, such a course of study will be given as is to be recommended to a student just setting out to acquire his profession; leaving each inquirer to determine for himself what part of such a course he is qualified in.

In order that he may learn the first important step—the proper methods of handling his drawing instruments and of acquiring correct habits of draughting—I should advise the student to begin with a course of problems in practical geometry, not only for the reason that it is in itself an excellent introduction to linear drawing, but because it will enable him to acquire, simultaneously with the practice it gives him, a knowledge of certain matters which he will find very necessary at a point further on in his course. These problems should include exercises in all the divisions of plain geometry, viz., lines, angles, polygons, the conic sections, and the transcendental loci. There are but a few good text books on the subject, but as all the problems are worked out in them, little or no preliminary knowledge of mathematics is required at this point of the course. The architectural student will probably find Tarn's *Practical Geometry* most useful in this connection, as it is prepared with a view to his special needs. Next, he should procure some good examples of linear drawing, such as tile patterns, outline elevations of buildings, etc., and make careful and accurate copies of them; remembering always that there are three things he must strive to attain in his work—(1) Precision; (2) Neatness; (3) Celerity, and in the order named. These being attained, he should next proceed to the laying on of tints, and washes of color and ink; beginning with tile and other patterns in ink. He is now prepared to make creditable copies of architectural drawings, a process involving all the knowledge he has previously acquired, both as regards form and color. He should copy here over as wide a range of subjects as possible, including working plans and elevations, detail drawings, and sketches of detail in freehand. And let me say here that the practice of freehand sketching should be begun as soon as possible, and continued to the end; as there is no one requirement of so much value to the student, both as regards the method of training involved and the value of the accomplishment itself. The subjects of his sketches should range from copies of freehand sketches of plans and solids, to drawings by the student from the cast, or finally to sketching from nature as well as from the building. The vast fund of motives to be found by a careful sketcher of natural forms, will give him a valuable collection to be drawn from in his future work. The student is now ready to begin the study of materials, which should be carried on simultaneously with that of the mechanics of buildings; the former dealing with the characteristics and capabilities of all the building materials, and the latter with the best methods of using them in construction. This is of the utmost importance, as need scarcely be pointed out; since by such knowledge we are enabled to use the right things in the right places, and to be confident that we have done so. For materials and methods of construction I do not know of any *one* work which is so good as the *Notes on Building Construction*, published by the Rivingtons, London. The student should be cautioned, how-

ever, that while it contains an excellent exposition of the nature of materials and the methods of construction, some of the examples of the latter, as given in its pages, are different from methods used in similar circumstances in this country. This work, however, supplemented by a careful study of Hatfield's *Transverse Strains* (this, an invaluable treatise for the student), and finally a constant course of observations and sketches of such examples of sound construction as the student may have access to, will equip him with all the preliminary knowledge of those things he can well acquire.

Design might be defined as the art of shaping and disposing the materials used in building in the most proper manner. The student, therefore, having arrived at a due understanding of the nature of such materials and of the laws which govern their combinations, is fully prepared to enter upon the last stage of his studies—the mastering of the principles and practice of design. This is in order that he may round out his work with that last great quality of "well building"—*fairness*. I should advise him to begin with the study of planning, since the plan is the germ of all building. He should make himself familiar with the laws which govern it (for it is very nearly an exact science), and study how to apply them so as to fitly meet the requirements of each special case. The book that will most help him here is Kerr's *The Gentleman's House*, or, Stevenson's *House Architecture*, Vol. II. The former a more elaborate and scientific work than the latter, but inferior to it in some other respects. Then let the student carefully read the following works, in the order named: Ruskin's *Stones of Venice*, and *The Seven Lamps of Architecture;* and Garbett's *Principles of Design;* this last not at all to be compared in value to the former, but containing nevertheless some thought-worthy suggestions. Then, finally, let him study the history of architectural design from the earliest historic times to the present day; being careful to note how the fundamental principles of the best builders of all ages have been the same, and how the violation of them has surely and instantly been followed by a loss of purity and beauty in the design, from the pseudo Greek of the first centuries to the last new wrinkle in "Queen Anne," and from the time that the mastery of materials and their applications is acquired, let the student make himself familiar with the current of the professional thought of his day, as reflected in the pages of the professional journals, both in this country and abroad—lest, having acquired a sufficiency of book knowledge only, he emerge from his seclusion to find himself confronted with the conditions of professional life, of whose existence he has been as ignorant as he is unable to overcome the difficulties they present. Then, and at last, he might feel able to enter the practical duties of his profession, with the consciousness of possessing a sound knowledge of its principles which only practice and experience can improve.

It only remains to be said that this course has been sketched but in the barest outline. That many things of great importance have been no more than alluded to, while others equally important have been taken for granted. And finally, if I were asked whether it be possible for any student to master such a course unaided, and alone, I should say frankly, "no," for while there are some portions of it that could be acquired unaided, in spare hours, taken it may be from other pursuits, a great deal of it can only be learned in an architect's office, or in one of our architectural schools, and some of it only in the latter. And my advice to all architectural students of limited means would be, to take at least one year's course of study in such a school. There are three or four now in operation in this country doing good work, and aiming to provide that higher professional education which the condition of things with increasing earnestness, year by year, and, as I have said, there is experience of the highest value to be had in them, which cannot be acquired elsewhere. The libraries, museums, photographic collections, etc., of such schools present advantages to the student that he could command in no other way.

One word more. It has been well said that on any given subject there is always some one book which contains it all. Though it would be too much to expect this to be literally true of such a comprehensive subject as architecture, yet Gwilt's *Encyclopædia of Architecture* comes near to meeting the requirements of the case; and I would advise the student who has to count the cost of his education closely, to buy this one book in preference to three or four others. It is by no means complete, and it is undoubtedly true that any one of the subjects contained in it is better treated of elsewhere, but the point I wish to make is, that there is no other way of possessing so much professional information for so little money. The last edition, edited by Papworth, is the best.

Planing Mills.

BY J. T. L.

PROBABLY there is no one thing about a planing mill that gives more general satisfaction than a good, evenly tempered and well balanced set of knives. I am led to speak of this at this time, from a little experience I once had in changing from one manufacturer of machine knives to another, and if this little experience will be of any use to others, they are welcome to it. Owing to a little difference of opinion in regard to the price of a set of knives which the makers had made narrower than the order, owing to a flaw in the steel, the proprietors concluded to order their knives from some other maker. Not long after, a drummer, representing another manufacturer, came along and the order was given to him for six sets of different lengths of knives, at 2 cents less per inch than they had been paying the other concern. This was a little something worth saving, for a little over 500 inches, at 2 cents per inch, was quite an item. Well, in due time, the new knives came, and the first set of 26-inch knives put on. And not more than three boards of good clean pine stock had been run before we had to stop, for the whole surface of the boards was just a scratch, and, on looking at the knives, found them nicked from end to end, some more than others, but the whole set more or less nicked. These were taken off and another new set put on. These did not nick, but when we came to sharpen these would be, perhaps, two inches in length, so hard that a file would hardly cut, and the next two inches more or less would be as soft as annealed steel.

Every one sharpening knives with a file, knows the consequences of such a condition of things: hollows in the soft spots and high places in the hard ones, making the surface of the stock planed uneven. Well, out of the six sets of knives there was not one really good, even-tempered knife.

Owing to the little feeling between the parties, we worried the new knives through, and finally used them up, but I guarantee to say that if they had thrown the whole six set of knives entirely away and gone back to their old reliable manufacturers, which they eventually did, they would have saved as much as the whole lot cost, for, the loss of time in sharpening and taking off and grinding and resetting soon eats up the cost of a set of knives. One thing is certain, that that concern never allowed any little difference of opinion to change their orders to some new unknown and untried parties, not even for two cents less per inch.

I think there is no place where more economy can be shown than in buying good, evenly tempered knives. I know that a great difference of opinion exists among planing machine men about the hardness of knives. Some want them so hard that a file will hardly touch them, while another wants them as soft as they can be made, and have any temper in them. Every one knows who runs a machine that once in a while we run across a soft knife in a set, and it will hold an edge full as well as the harder ones. What the quality of steel is that makes it so I cannot tell, but I know that it is a fact without being able to account for it. I have once in a while run across a knife that apparently had a fire crack run across the whole width of the steel just deep enough so that when it was ground to a thin edge there would always be a little nick in it, and the only way I could get over it was to keep it filed a little back just in this spot, and let the next knife cover it. I have done this rather than throw the knife out, for all the rest of it would be very good. Any such thing, however, is a source of annoyance and care, and it needs the "mildest mannered" man in the world sometimes, to keep an even temper, when anything like a planer knife works badly, and you have to stop every five minutes to sharpen out some little nick, more especially if you have got a job that is driving. I do not understand the intricacies of knife making, and so cannot say why one knife in a set is good and another possibly good, and another decidedly bad; but if the old saying that "what man has done man can do," is true, I do not see why one maker with equally good men, and care, and stock, cannot make just as good tools as another. I know there is a great difference in working the different kinds and grades of steel, but with proper care after one has got used to a certain grade of steel, I can't see why a uniform article cannot be produced as a general thing. I can see why that once in a while there may be a poor weld between the steel and the iron, for occasionally accidents happen under what seems to be the most favorable conditions. But I cannot see why, with a good, even grade, and quality of steel, and good, clean fires, and good, responsible, careful workmen, there may not be produced a perfectly even grade of knives. I know it is done by some manufacturers, and I cannot see why, under the same conditions, all makers cannot produce a uniform grade of goods.

I did not propose here to speak of grinding knives, but there is so much difference of opinion in this matter that perhaps a word here may not be amiss. I have always made it a point to grind so that a straight edge laid on the bevel of the knife would come just below the top of the bolt that holds it on, and then in using a file to sharpen, make a somewhat shorter bevel and sharpen so till the knife become too stunty, and then take out and grind again. Some grind two bevels, although I have never known but one man who has done this. Two bevels may be well enough where a machine is running hard wood all the time, but for pine and all other soft woods I like a good long bevel. This gives a good clearance, and a mill will run much easier than with a little short stunt bevel. However, I think that stuff will pick up less with the short bevel. I have very frequently, in running hard and cross grained woods, sharpened from the front side of the knife with excellent results, but to do this a mill should be sharpened very often so the edge of the knife will not get round and grub instead of cutting,

Sketches for Chapel
Bay-Mead
N.J.
Fred^k B. White
ARCHITECT
PRINCETON N.J.

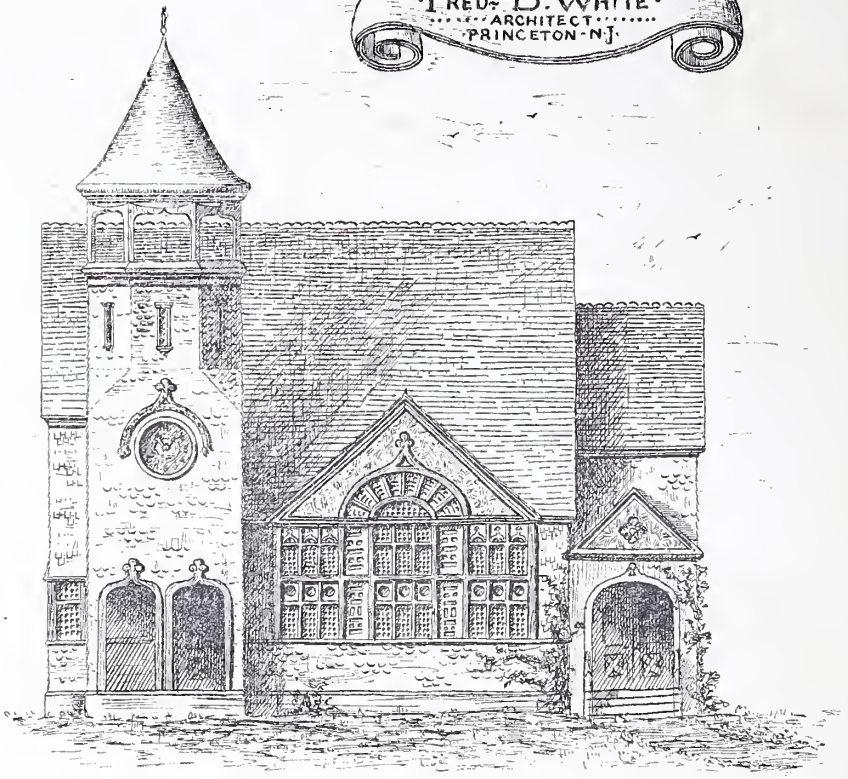
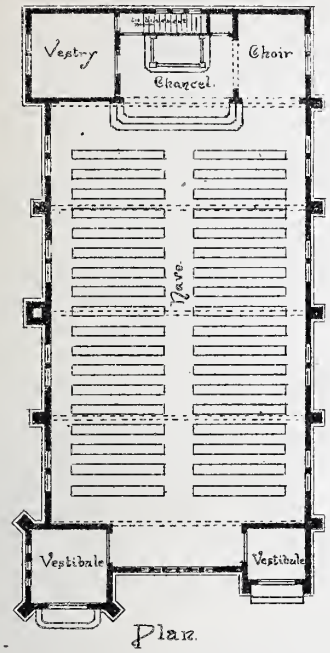


PLATE No. 75



Plan.

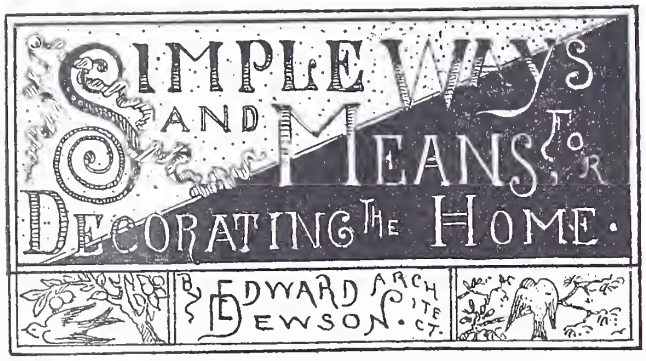
E. M. HOWARD. ARCHT.

PERSPECTIVE SKETCH of St. Luke's Church. 7th. Ward.

WHEELING 1207 Main St. W. VA.

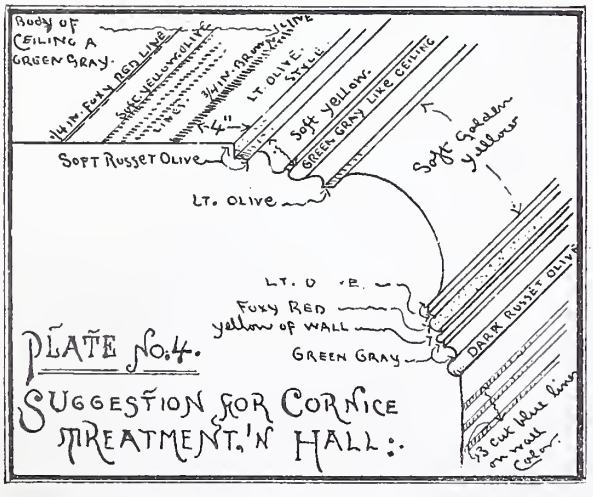
which very soon makes bad work. Too little attention has always been given to grinding conveniences. And if there is one place darker and more inconvenient than all the rest of the mill, the grinding stone is generally put there to get it out of the way, and there is nothing really about the mill that should have a lighter and more convenient place than it. Quite a number of years ago the proprietor of one of the best and most reliable manufacturers of machinery and tools in New England had a very roomy and convenient annex built on to his shop, and while it was being built a friend of his asked him what he was going to do with that pleasant room. He said: "I have been watching my men grind for a long time, and have come to the conclusion that if anything about the shop needs a good light it is a grindstone."

I have always used the grindstone in preference to an emery wheel, for I long ago came to the conclusion that an emery wheel, for some reason, takes the life out of the steel, and knives are more likely to nick and crumble than after using the common grinding stone. But a man wants to be wide awake in the selection to get one just adapted to his business. A poor stone in a dark room is a perfect nuisance.



THE next matter for consideration is the finish and decoration of wall surfaces and ceiling. We will suppose that our wall woodwork is walnut, as is generally the case, in our ready-made house, when hard wood finish is used down stairs. We will arrange a scheme for color decoration in keeping with the somber tone of the wood, and will try to make our effect brighter, by harmonious contrast, rather than by the simple blending of tones.

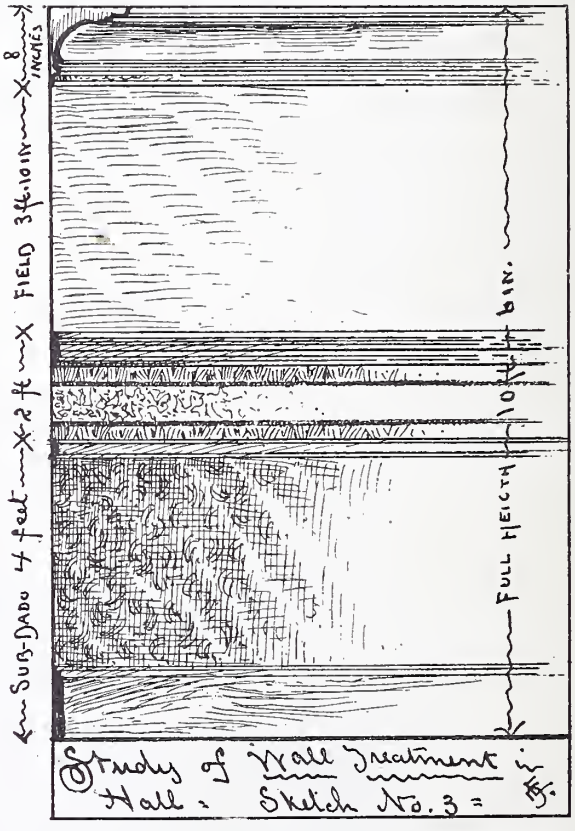
The dado or lower wall decoration is desirable and appropriate here. When the wall is large enough to admit of such a treatment to panel up the wood, from four to six feet high, as did our ancestors in the good old colonial days, is very rich and suitable; but as the wall we have selected for treatment is but eight feet wide, such a dado would not be admissable. Of late the painted and paper dado has been a much abused feature of modern house decoration, and is used everywhere without "rhyme or reason." Yet there is a use and place for the dado, as it gives a certain character



and stateliness to a wall that could not be obtained by any other mode of treatment, especially in such rooms as dining-room and library and sometimes the sitting room, as well as the halls. It gives also a good starting point for a scheme of color treatment, and if selected with judgment may be a good background for furniture. Generally, the paper dado, so much in vogue, if left to the unskilled taste of the contractor or paper hanger (I am speaking of the majority of such, who work by the old established customs and rules, without giving the matter intelligent thought), is insufficient and narrow, giving to the room a short, tophcavy and badly proportioned appearance. A good general rule to follow is to place the dado molding on a line with the shelf of the mantel, when there is one, thus securing a uniformity of finish all around the room, and bringing it on an average about four feet from the floor. By giving it sufficient height we can break it up into bands of color, and in this way give a pleasing variety to our wall.

In our hall we may safely go a step beyond this, and place the dado rail from five to six feet high, for here we wish to express breadth and character of treatment.

This wall is ten and one-half feet high. We will begin by laying off six feet up from floor, for our dado; of the remaining four and one-half feet, eight inches next the ceiling is filled by the conventional plaster cornice, the remaining space, A, in the following *Sketch No.* 3, we will call the field, taking the place, in this instance, of the top border or frieze. The field of our wall we will fill in with a soft golden brown, or old gold tone, not too dark, but tending more towards the yellow. This is to contrast with the somber tones of the woodwork, and to brighten up and lighten things as much as possible. On the wall below the cornice and also above the dado, carry a little group of three or four quarter inch lines of blue. This must not be a clear, but what is termed a "cut" color—ultramarine blue toned down with a very little raw umber. The effect of these small masses of clean cut lines on the gold ground will be very rich. If paper is used it should be of two tones: a darker pattern over a light ground, and not too marked in character. I would advise, however, the use of distemper or water color, in one clear unbroken tone, filling the field from dado to cornice; this is cheap and durable enough, when, as in this case, it comes above the reach of everyday use and wear. A rich old gold or golden brown, may be made from Oxford ocher and medium chrome yellow, and a still deeper tone by using orange

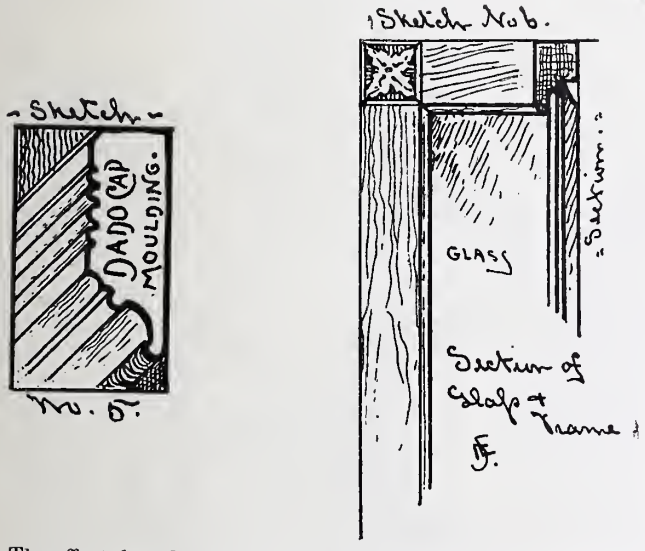


chrome in place of the medium. It is not practicable here to give an exact formula for mixing, but suffice it that a preponderance of ocher will tend it towards the brown, while the chrome gives the yellowish cast. The judgment and taste of the reader who is interested in experimenting, must come into play to keep the balance of color toward the one or the other, as the case may seem to demand. Should paper be required, however, such a one as I speak of can be bought now at any wall paper warerooms, at prices varying from thirty to seventy-five cents per roll, and from that the prices run up to very high figures; but as we are seeking now for the best results, with the least necessary expenditure, while we can get such colors as we need in the cheaper goods, we will let the better qualities alone.

The increased demand for good colors and tones in the cheaper goods, has encouraged manufacturers both at home and abroad, to bring out papers of this class in nearly as good tones as the more costly article; and, where a few years ago we had but little selection, we now have a large and constantly increasing stock to choose from. I have found that the American papers of the cheaper

grades are, on the average, much better in tone and color than the same quality of foreign goods, while in the latter grades, the latter manufacturers take the lead.

As a balance for our warm colors on the walls, the ceiling should have a cool, greenish-gray tone—not too sharp on the green—and also avoiding a purplish tendency, as this will give it a heavy, muddy appearance, and clash sadly with the other colors. A three inch style of a very soft, low-toned, yellowish olive, should border the ceiling next the wall, and a short space inside this, a few nicely arranged lines of bluish olive, crossing each other at the corners. These lines should be about one quarter inch in thickness and half an inch apart. Five such lines make a good group. Inside of this, at a distance of about two inches, run another single one-quarter inch line of tan colored red, made from burnt sienna and stone yellow. This will give a simple and pretty finish to the ceiling. The cornice should be treated with special care, as the whole effect may be marred by careless or injudicious treatment.



The effort should be to marry or reconcile the warm colors of the wall with the cooler tones of the ceiling. To accomplish this, the cornice must be treated in soft, low tones, blending the cooler with the warmer colors in such a manner as to harmonize the whole, avoiding particularly any one strong noticeable color on the larger members that would attract the eye, such as red, dark-blue or heavy olive. The colors should invariably be soft in tone, excepting, perhaps, the lowest member, and as this acts as a dividing line between cornice and field, it may be stronger and darker. I recall an incident in my experience of a positive, but well meaning builder, for whom I once superintended the interior decoration of some houses, insisting loudly on the introduction into the principal member of a cornice, what he termed "tomatis color." Experience has taught me that it is wiser to give such men their rope, and let them bring themselves to a stand at the end of it, and in

this case, the presence of such a color at the top of a room finished in the softest of tints, spoke loudly for itself; in fact, to use a painter's term, "it swore." No louder, however, than did my good friend the builder, when he saw the unfortunate result of his effort to add brilliancy by introducing strong color; and ever after that he avoided any appearance of interfering or dictating but I have a feeling that he never quite understands to this day the why and wherefore of it.

The suggestions offered in the following *Sketch No.* 4, if carried out with judgment, will bring about good results. And bear in mind that what we are arriving at is to carry the eye by easy stages from the darker and warmer shades and tones of the wall into the cooler tones of the ceiling, blending them harmoniously by means of the cornice, with its quiet and mixed treatment of soft color. And if we stop the eye with a sudden jar, or some bright or strongly contrasting color, the whole effect is spoiled; for in no case can we introduce with good taste any large amount of erude color into such a scheme without unfortunate and trying results.

In our dado we have a space of six feet to fill, which I propose to do in the following manner: Measure up four feet from the floor, and at point place a $1\frac{1}{4}$-inch walnut molding. This divides our dado two-thirds of its distance up, into what we call a sub-dado. Fill this with a dark paper two or three shades of olive, red, antique blue and gold, on a dark brown or black ground, costing from 50 cents to 75 cents per roll. Directly under this molding, and also above the base board, run a three-fourth inch strip of black or very dark olive paper. This finishes the sub-dado. Above this we have a two-foot space, which cap with quite a heavy dado molding, also of walnut, the lower member of which should be painted black or ebonized. This molding may be about $2\frac{3}{4}$ inches thick, and of a shape as suggested in *Sketch No.* 5. Between this and the smaller molding below run a band of 18-inch wall paper, of a pretty and soft tone, taking care in the selection to harmonize with the surrounding colors. Fill in the space above and below this with plain paper, same color as the field, and it may be a shade darker, with good effect. Separate this from the 18-inch paper by one-fourth inch black moldings at top and bottom.

It may not come amiss here to give the reader some information regarding the sizes, prices, cost of putting on, etc., of American and foreign paper. The average width of low grade paper is 18 inches—8 yards to the single roll, 16 yards the double roll. The better grades of American are from 18 to 22 wide—8 yards the roll. English yards wide, 12 yards to the single roll. French and German paper yards wide, and average 9 yards the single roll. The cheaper grades are machine made, while the better grades are made by hand from wooden blocks, insuring thereby a much nicer result both in tone and finish, and making them, as a matter of course, more costly.

The cost of machine made goods varies from				10c.	to $1 00	per roll.
Handmade	American	"	"	65c.	to 15 00	"
"	English	"	"	40c.	to 25 00	"
"	French	"	"	$1 75	to 25 00	"

These are the average prices; handmade papers both in this country and abroad reach much larger figures, but these are decidedly extreme, and have no place here.

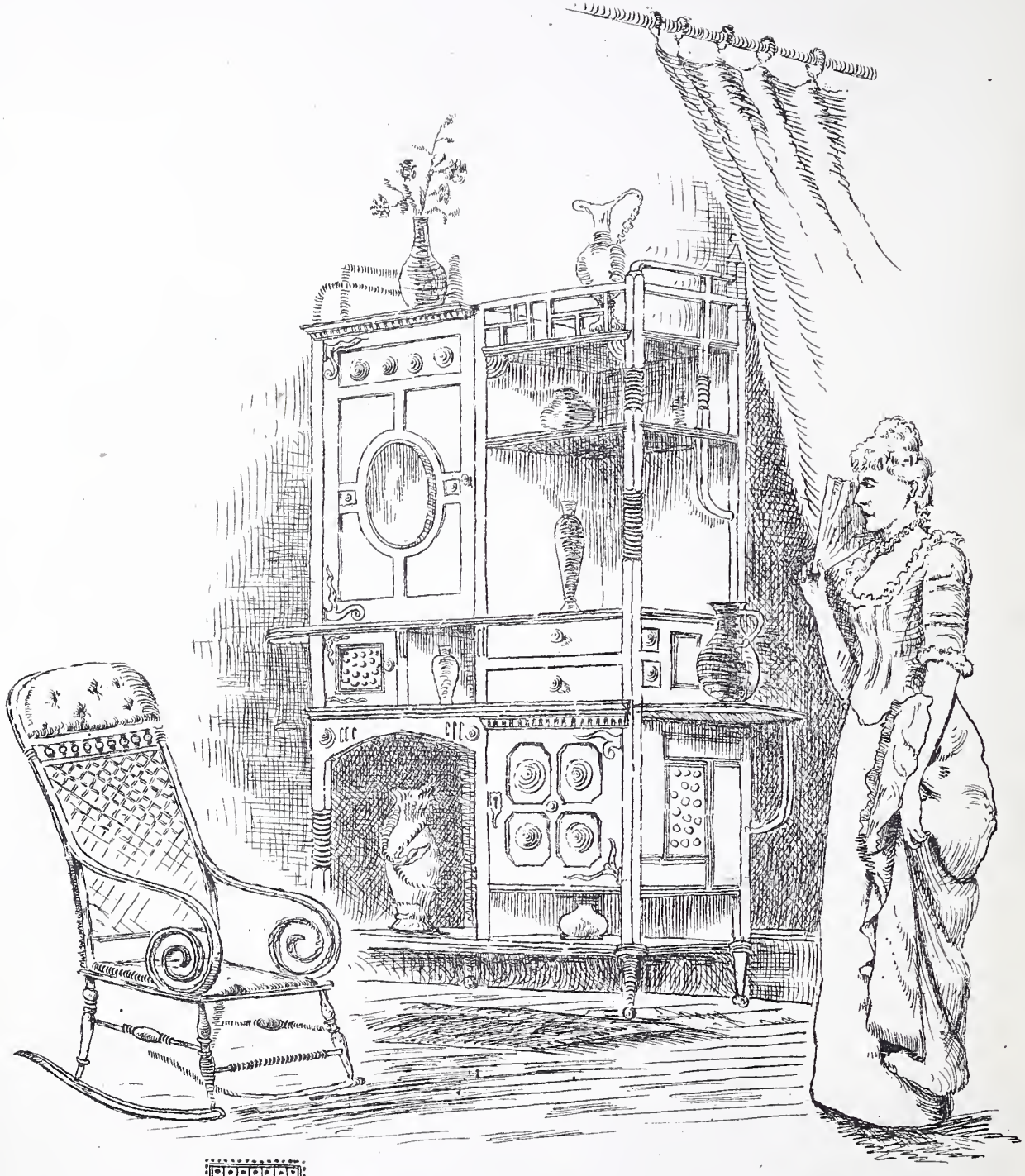
The cost of putting on varies from 15c. to 50c. per roll, according to the quality of paper and the amount of labor involved. For friezes it may be useful and interesting to know the market prices, so that we may know what to depend on in making calculations for papering.

The widest is called the		
Single Band, and is	18	to 20 inches wide.
The Two Band is	9	to 10 "
The Three Band is	6	"
The Four Band is	$4\frac{1}{2}$	"
The Six Band is	$2\frac{7}{8}$	"
The Eight Band is	$2\frac{3}{16}$	"
And the last and narrowest is	$1\frac{7}{16}$	"

These last three are generally called "binders," and are more often used to divide the field and dado papers under or in place of the dado rail, and at the top of very low chambers. These also are divided into machine and hand made, and range in price from a few cents to $3 or $4 per yard, according to quality. In giving these sizes, prices, etc., the purpose in view is to enable the householder who may contemplate papering to figure out and calculate for himself, or nearly as possible, the cost of such work before entering into it, and not to be entirely dependent on the contractor. This result may be readily attained by measuring the wall space, deducting the openings for doors, windows, etc. Decide on the quality and price of paper to be used, and with the knowledge herein given of the length and width of rolls, cost of putting on, etc., by a little careful figuring the number of rolls needed and their cost, including putting on, may be quickly found.

These sizes and prices may be of special value to those who, in living at some distance from business centers, find it necessary to order by mail, and thus are enabled to order the number of rolls and yards of border necessary, having first decided on the quality and color by sample. It is well to order one or two rolls and a few yards of border over the exact amount needed, to have on hand in case of accident, for the styles change so rapidly that it may not be easy in a year's time to match either paper or border. In depend

PLATE No. 76



Cabinet N. W. Cor. Penn Ave. and 6th St., Pittsburgh. Pa.
By E. G. W. Dietrich,

PLATE No. 77

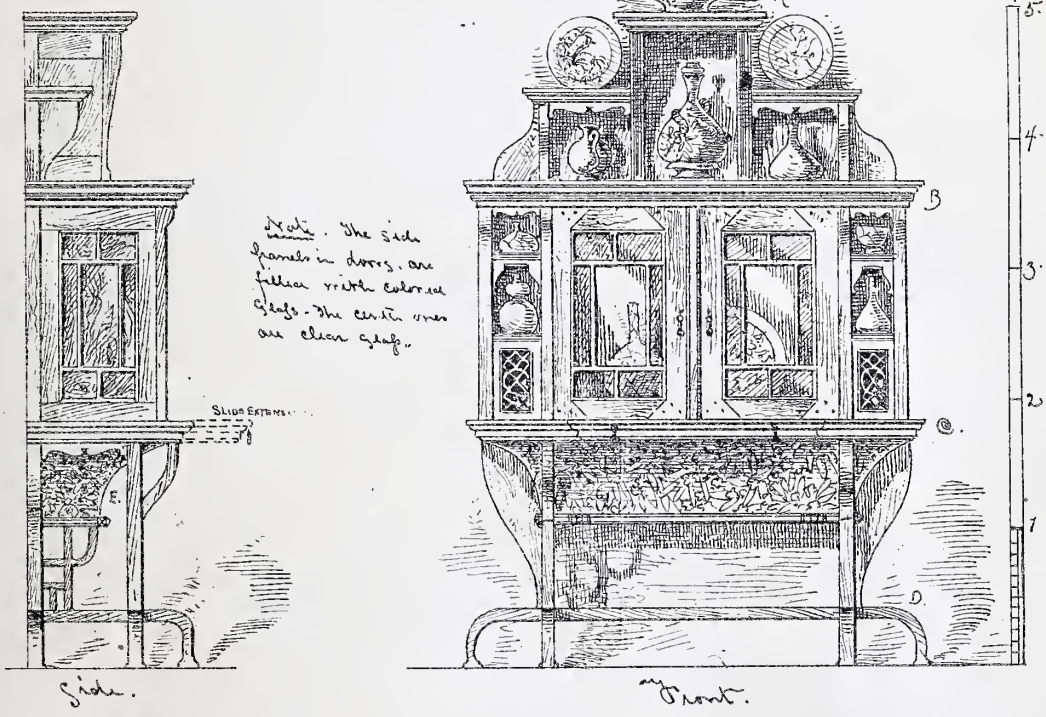
BUILDER AND WOOD WORKER.

"FREE WILL", SERIES.

A Parlor Cabinet.

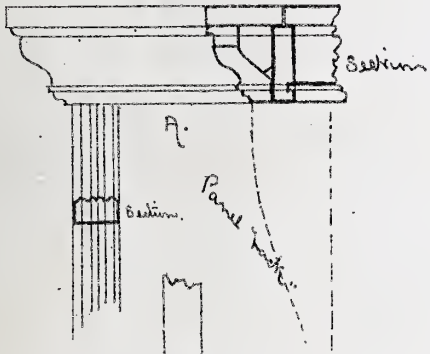
and Details.

Built of Pearwood, finish with high polish.

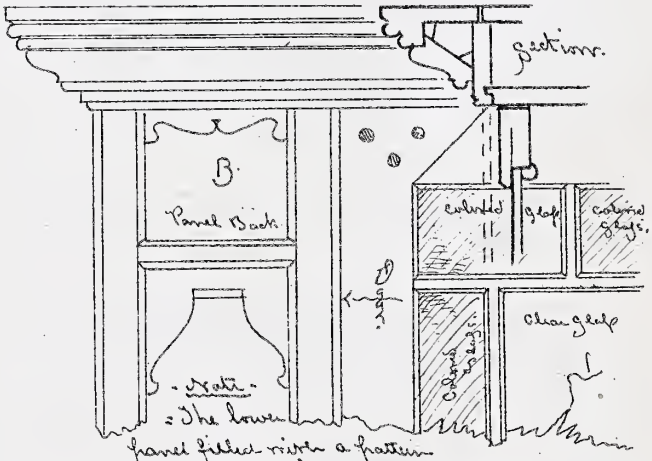


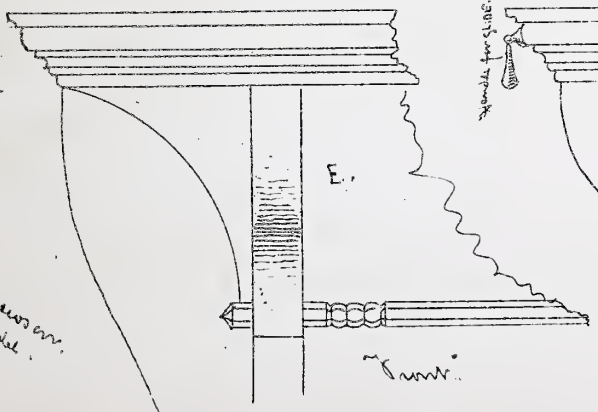
Side. Front.

Note. The side panels in doors are filled with colored glass. The centre ones are clear glass.

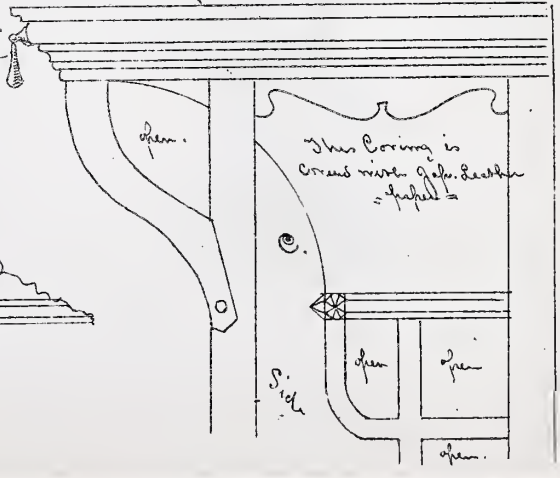


Detail of Post.





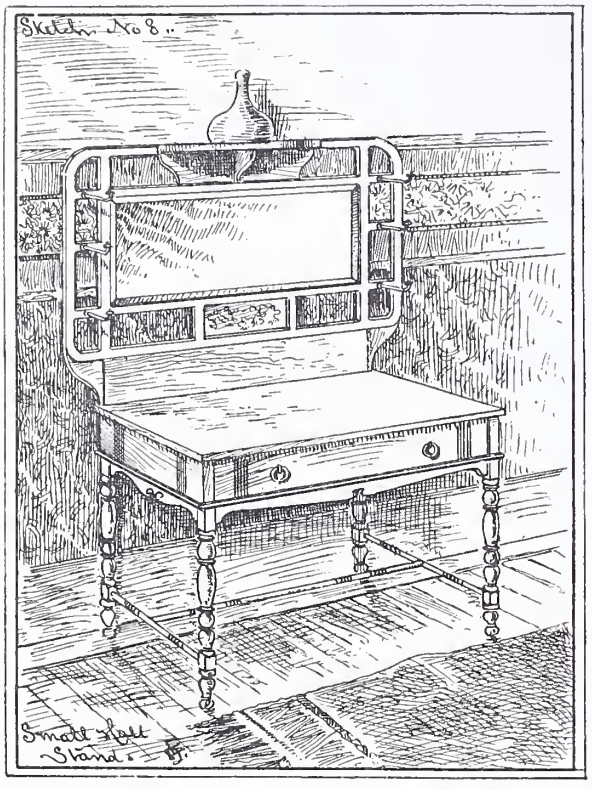
Post.



Edward Dawson. Invent. & del. 1882.

ing on the local jack-of-all trades, as some are obliged to, in small towns where skilled workmen cannot be readily procured, for the putting on of wall paper, special care should be taken that the old paper, if there be any, be well scraped off, and the walls properly sized, and also that the new paper is put on with "butt joints," and not with "lap joints," after the old school of ten and more years ago, otherwise the walls are disfigured by long parallel ridges, that no amount of after decoration can preclude.

Having considered the floor, walls and ceiling of our hall, we now come to the question of necessary furnishing. I say necessary, for here, of all places, we want only what is needed for use, for the hall is apt to be narrow, and we cannot afford to crowd ourselves.



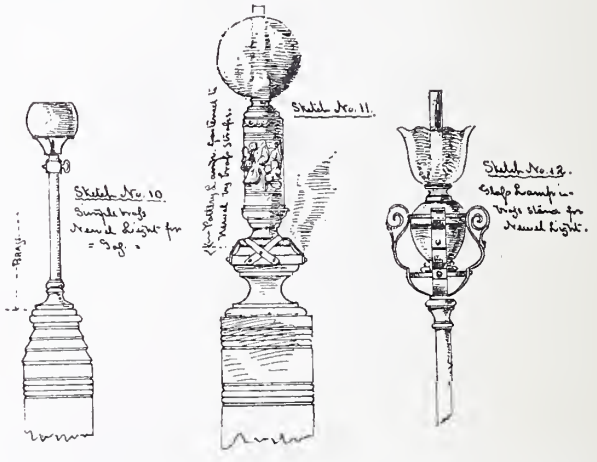
The hat rack and umbrella stand, two or three plain chairs and a small table, will do in this case for floor furniture. On the wall a few simply framed photographs—the style of which I will speak a

little later on—and a fair-sized mirror, the latter being allowable and handy for "my lady" on going out to church or call, to enable her to give a last lingering glance, and a pat here and there to bonnet, cloak or dress. This glass should be 4 feet 6 inches or 5 feet high, and about 30 inches wide, finished with a 3-inch black walnut frame, flat and plain, with an ebonized head on the outer edge (*Sketch No.* 6). Under this should stand a small black walnut table, with simple turned legs, about 3 feet 6 inches long, 20 inches wide, and 30 inches high. This is to hold a silver card receiver, or in place of this, a Japanese or English blue and white plate of odd shape and design, such as can be bought for 75c. or $1, will answer the purpose nicely for holding cards, etc. A table similar in size and pattern to the one shown in *Sketch No.* 7 can be found in any well stocked furniture establishment, and costs, in walnut, about $8 or $10. If you have one or two odd shaped chairs, the hall is the place for them, and they need not necessarily be of the same pattern—either walnut, dark oak or ebonized wood will be in keeping.

Upholstery, except it be in leather, is out of place, as the object here is dignity and not luxury; the latter quality we will reserve for our dining room and parlors.

In the selection of hall stand, we should be as simple and unobtrusive as possible—avoiding the heavy and ornate article, however tempted by the tradesman. The one shown in *Sketch No.* 8 is simple, neat and useful, and answers all the requirements. I designed it some time ago for a Boston warehouse, and have no doubt it can be bought most anywhere, as it is a "Trade" article. The cost is about $30.00 in walnut.

For pictures or frames, a few good photographs of architectural scenery, or well known statuary, framed in cherry, mahogany, or dark oak, from $\frac{3}{4}$ to $1\frac{1}{4}$ inch wide, flat and simple, with an inside molding of beaded or plain gold. I would not advise the use of mats around such subjects and treatment, unless the photo is too small to frame nicely; in that case some dark or low toned pebble paper, with a $\frac{1}{4}$ inch gold margin next the picture may be used, taking care to harmonize well with the surroundings. If the photo be a dark one, with details sufficiently marked to warrant it, a pebble gold paper for the mat will look well, using in place of the inside gold molding one of ebonized wood. Do not, under any circumstances, use a white mat, as it will be out of all keeping with the quiet harmony of colors. *Sketch No.* 9 shows my idea of the simple framing.



The lighting, by gas or otherwise, is the next consideration. When gas is used the prettiest and neatest way of lighting is, as shown in the interior sketch on the newel post, the pipe being carried up through the post from the floor. A simple design is shown in *Sketch No.* 10, taken from a catalogue of a Boston firm. The style is good and has the added advantage of being moderate in price. When gas is not used and the dependence on oil or other mediums become necessary, the pretty modern oil lamps come nicely into place. I will suggest one or two simple arrangements, that may be found to answer the purpose very nicely.

Sketch No. 11 shows one of those pretty little pottery lamps so much in use at the present time. By placing it on the top of the newel, and securing it as shown in the sketch, by a simple arrangement of narrow brass straps, we make a fixture of it, and avoid accident from a chance jar or knock. Still another and more original method is shown by *Sketch No.* 12. This represents a short brass rod fastened neatly to the top of the post, surmounted by a simple basket made from brass wire, in which is placed one of the pretty corrugated glass lamps of ruby, canary color, or blue, that have lately come into the market. The rod and basket may be gotten up and in place by any locksmith with a taste for such things for about $5. The lamps cost $2.50, and at the added expense of $1.50 a neat duplex burner can be obtained, which adds greatly to the quality and quantity of the light. So you see how for a small sum we can have something pretty and neat, besides being a little out from the beaten track of every day experience. If more light is wanted, surely there is room on the little table for another lamp, and standing before the glass, as it will, the reflection

gives added brilliancy, illuminating our hall almost as brightly as would a small chandelier.

We may well stop here, but in the interest of those who care to follow I will venture one step further, and touch on the subject of stained glass in the panels of the outside hall doors. During the warm weather the inner doors, if there is a vestibule, will be likely to stand open, both for light and ventilation, and in such a case what could be more pleasing to the eye or the senses than a glimpse of the soft harmony of blended colors, reflecting bright rays here and there, as the sunlight slants through their liquid transparency, giving a brilliant finish to the decorative harmony and a sense of fitness and completion. This feature, like the others, must be unobtrusive in design, but may be brilliant and sparkling in color if properly blended, and selected to tone and accord with the surroundings, as part of a harmonious whole. On this matter of stained glass, its qualities, prices, &e., I will speak later, in its proper place and season.

Chimneys.

WE think we may venture the assertion that at least one-half of the chimneys in use to-day are altogether too small to economically serve the purpose for which they are used. There seems to be a very general misunderstanding in regard to their correct proportion among those most deeply interested in their efficient performance, viz., the owners of the chimneys themselves.

The object of a chimney is, of course, well known to be the means by which the draught necessary for the proper combustion of the fuel is produced, as well as to furnish a means of discharging the noxious products of combustion into the atmosphere at such a height from the ground that they may not be considered a nuisance to people in the vicinity of the chimney.

Regarding the second of the above purposes for which chimneys are built, we need only say that it is of secondary importance only, and that where due attention is given to the proper methods of setting boilers and proportionating great areas, furnaces, and rate of combustion, the smoke nuisance is comparatively unknown, and is of no practical importance whatever.

The main points then to be considered in designing chimneys are the right proportions, to insure, first, a good and suffieient draught, and second, stability.

Without entering into any demonstration of the velocity of the flow of the heated gases through the furnace and flues leading into and up the chimney, we will briefly state a few of the principles governing the dimensions of chimneys. The motive power or force which produces the draught is the action of gravity upon the difference in the specific gravities of the heated column of the gases of combustion inside the chimney, and the atmosphere at its normal temperature outside of the chimney, by which the former is forced up the flue ; and the laws governing its velocity are the same as those governing the velocity of a falling body, and it can be proved that its velocity, and, consequently, the amount or volume of air drawn into the furnaee and which constitutes the draught is in proportion to the square root of the height of the chimney. It is a common error that the force of the draught is in direct proportion to the height, so that, with two chimneys of the same area of flue, one being twice the height of the other, the higher one would produce a draught twice as strong as the other. The intensity of draught under these circumstances would be in the proportion of the square root of 1 to the square root of 2, or as 1 to 1·42. To double the draught power of any given chimney by adding to the height it would be necessary to build it to four times the original height. Practically there is a limit to the height of a chimney of any given area of flue beyond which it is found that the additional height increases the resistance due to the velocity and friction more rapidly than it increases the flow of cold air into the furnace. For chimneys not over 42 in. in diameter the maximum admissible height is about 300 ft.

From an investigation of the same laws we find that the velocity of the flow of cold air into the furnaee is in proportion to the square root of the ratio between the density of the outside air and the difference in the densities of the outside air, and the heated gases in the chimney, from which we may deduce the fact that very little increase of draught is obtained by inereasing the temperature of the gases in the ehimney above 550 or 600 degrees Fah. By raising the temperature of the flue from 600 to 1,200 degrees we would increase the draught less than 20 per cent., while the waste of heat would be very considerable. Conversely, we may reduce the temperature of the flue about one-half when the temperature is as high as 600 degrees by means of an economizer or otherwise, and the *reduction* of draught force would be only about 20 per cent., as before.

It is found that the principal causes whieh act to impair the draught of a chimney and which vary greatly with different types of boilers and settings, are the resistance to the passage of the air offered by the layer of fuel, bends, elbows, and changes in the dimensions of the flues, roughness of the masonry of brick flues, holes in the passages which allow the entrance of cold air, and generally any variation from a straight, air tight passage of uniform size from combustion chamber to chimney fiue, and the resistance to draught is in direct proportion to the magnitude and number of such variations.

In designing a chimney, it is, therefore, always necessary to consider the type of boiler, method of setting, arrangement of boilers and flues, loeation of chimney, and evcrything which will be likely to in any way interfere with its efficient performance. Much, of course, depends upon the judgment and experienee of the designer, and it would be impossible to give any general rule which would cover all cases. When only one boiler discharges into a chimney, for instance, the chimney requires a much larger area per pound of fuel burned than when several similar boilers discharge into a chimney of the same height, and taking all these varying circumstances into consideration, a great deal of judgment is in many cases required to determine the proper dimensions.

It is a common idea a "chimney cannot be too large"—in other words, the larger the area of the flues the better the draught will be, but this is not always the case. In many cases where a chimney has been built large enough to serve for future additions to the boiler power, the draught has been much improved as additional boilers have been set at work. The eause of this is to be found in the increased steadiness of draught where several boilers are at work and are fired successively, as well also as in the better maintenance of the temperature of the flue, as the velocity of the gases necessarily increases with the increased amount required to be discharged, and they do not have time to cool off to so great an extent as when they move more slowly.—*Building and Engineering Times.*

Oscar Wilde.

IN a recent lecture, Mr. Oscar Wilde, the popular exponent of "Utter'sm," did not fail to show up some of our short comings in matters of taste. He described his impressions of many American houses, ill designed, deeorated shabbily and in bad taste, and filled with furniture that was not honestly made and was out of character. His picture of cheerless rows of houses, glaring bill boards and muddy streets was equally graphic. He pointed out that this was the condition in America, whereas in England the artists and the handicraftsmen are brought together to their mutual profit. It is to be regretted that ridicule stifles many of the good things he advocates. As he justly deelared, the two greatest schools of art in the world had their origin with the handicraftsman. Arguing from this, he pleaded for the establishment of a school of design in each city. He asserted that if decoration is a fine art, all the arts are fine arts. The real test of the workman is not his industry or his earnestness, but his power of designing. The surroundings of the handicraftsman in America are now meaningless architecture, sombre dress of men and women, and a laek of a beautiful national life. He would not have us build another Pisa, surrounding and inspiring Michael Angelo ; neither would he have us bring back the thirteenth century, for that would be impossible and wrong. But he would have an art teaching that would suit the nineteenth century.

Like Mr. Ruskin, Mr. Wilde has a horror of this mechanical age. He pronouneed against machine made ornaments, as being ugly, coarse, and bad, as compared with beautiful and durable handiwork, but he wisely observed that he only objected to machines when making machines of operatives, and not when they relieve men from ignoble tasks. They must not mistake the material of civilization for civilization itself. It is the use to which we put these things that determines whether the telephone, the steam-engine, electrieity, are valuable to civilization. The workmen require to be strong, have a healthy physique, and a sense of individualism, which is the keynote of art. The lecturer appealed for schools of design, and means of teaching art to the poor, so that they can beautify their homes. He did not want the rich to possess the more beautifal things, for they have enough. One might live in a whitewashed eottage with a fireplace set with red tiles, where an ill designed and vulgarly furnished house would be unendurable. Mr. Wilde gave many praetical suggestions on household decoration and art studies.

Stairs.

THIRD PAPER.

PLATE 64 (Aug. No.), FIG. 1.—Nos. 1 and 2 show a plan and elevation of a newel stair. The first quarter space contains three winders, the next quarter space is a landing; the lower flight is shown partly in section, exposing the rough string D D, and its connection with the bearers C C. The front string A A should be tenoned into the newels below and above.

FIG. 3.—No. 1 shows the plan of a geometrical stair with winders. In the first quarter space, or lower half of the figure, the lines of the steps are drawn to the center of the well hole, and this is the usual way of placing the risers; but drawn thus as radii of the circle, they are, obviously, too narrow at the inner end next the well hole, and too wide next the wall, and if two persons were passing each other they would both be forced to use part of the

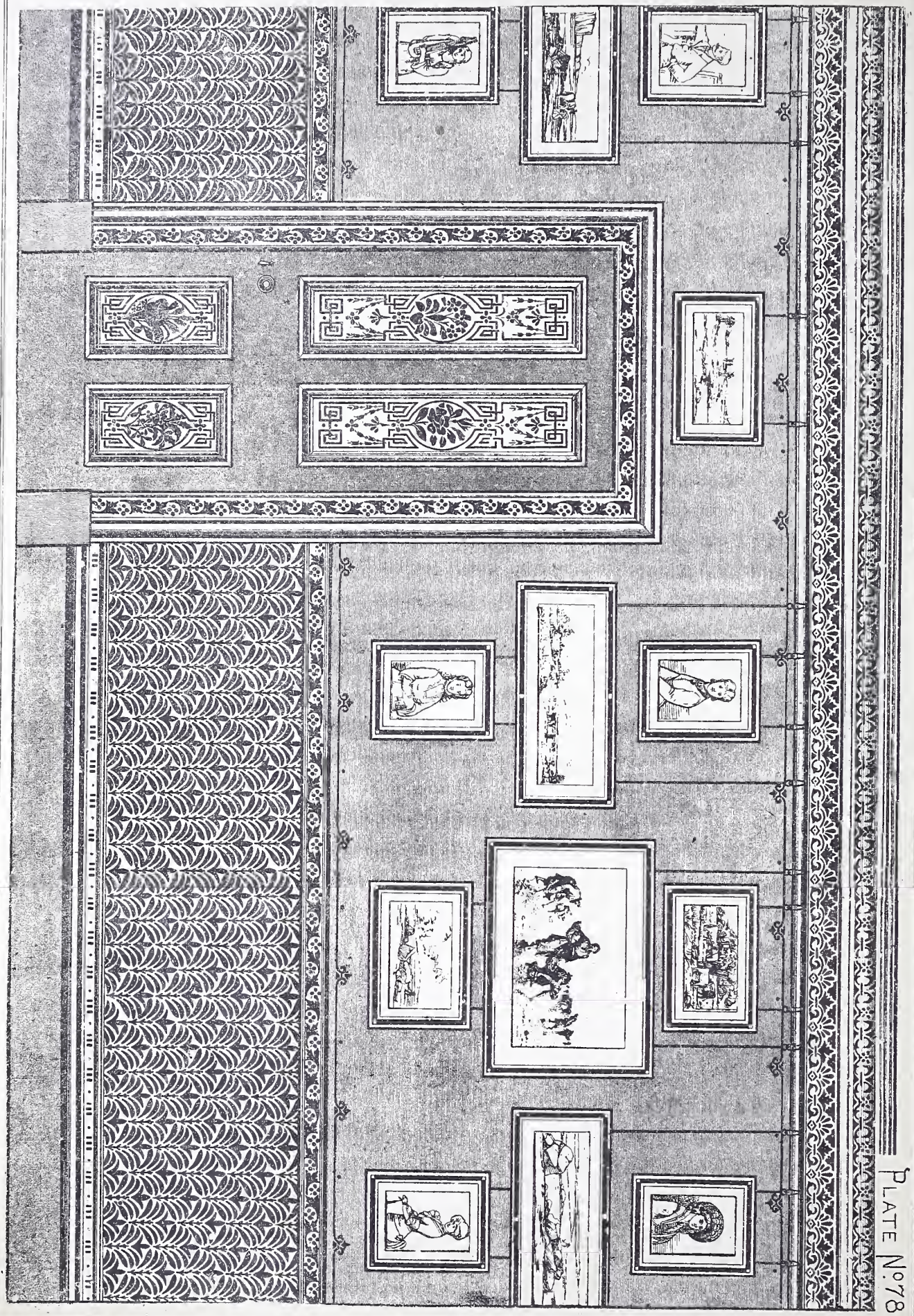
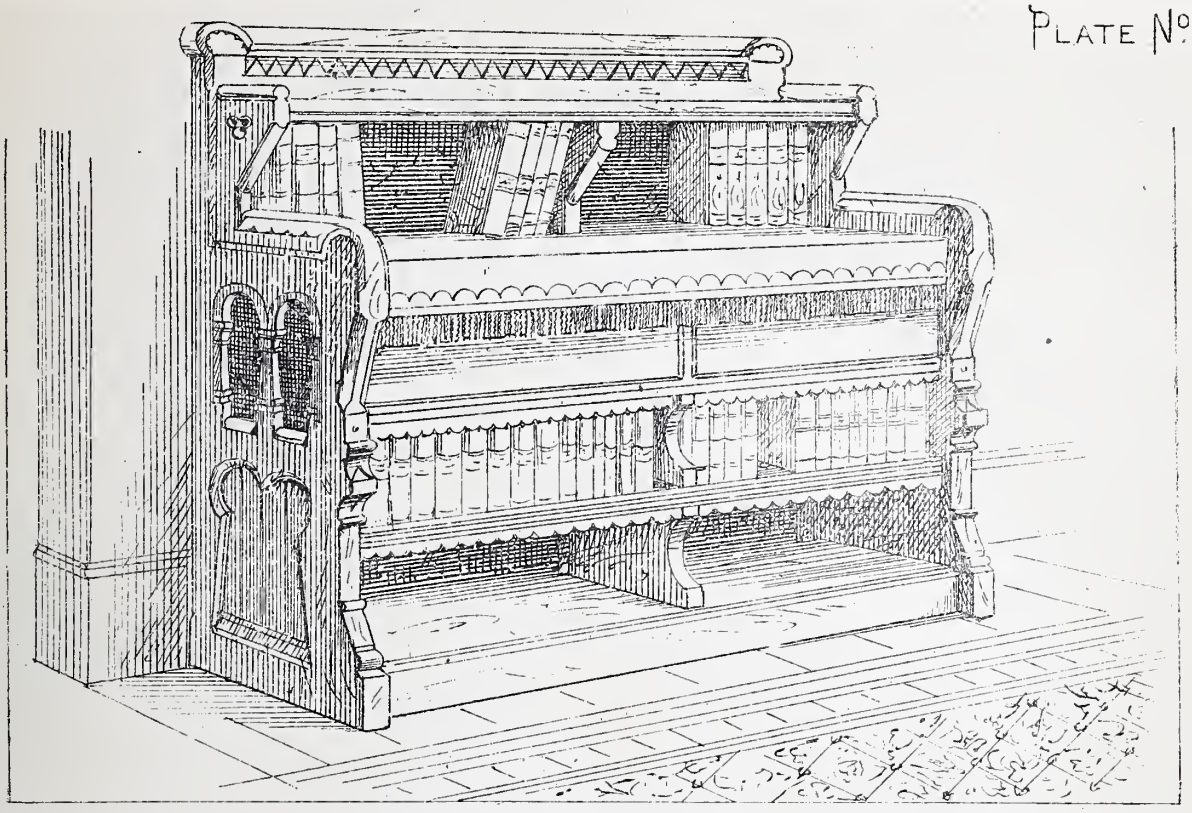
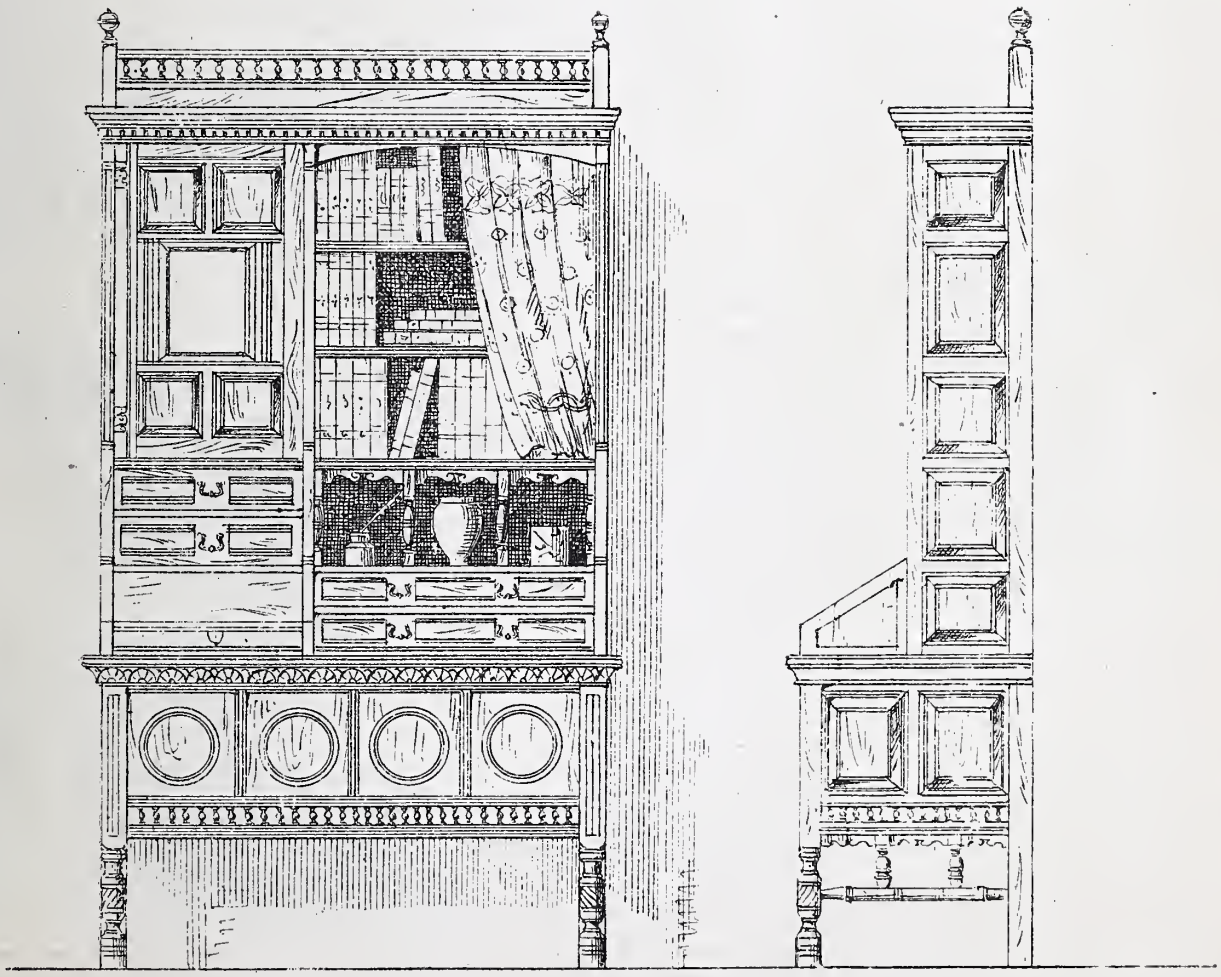


PLATE No. 78

PLATE No. 79





Designs for Bookcases. By Bruce J. Talbert.

tread, most inconvenient to walk upon. Further, as the risers of the steps are all of equal height, it follows that the slope or ramp of the string board along the ends of the fliers, from the first to the seventh step, will be much less steep than that which subtends the narrow ends of the winders, and the result will be a very ungraceful knee at their junction. Both of these inconveniences can be overcome by adjusting the steps in such a way as to distribute the inequality amongst them, or, as the French term it, by making the steps dance, as is shown in the upper half of the figure. This may be accomplished either by calculation or graphically. By the first method, the step which is in the center of the circular arc is regarded as a fixed line, and the divergence from parallelism has to be made between it and the extremes either way. But it is not necessary to begin the divergence at the first step, nor indeed is it advisable, and in general the first and last three or four steps are left unaltered, so that they may be perfectly parallel to the landing. Suppose, then, that the divergence is fixed to commence at the fourth step, it becomes necessary to distribute eight spaces along the center of the string, commencing at the center line of the stairs, which, from the center line to the fourth riser, shall follow some law of uniform progression, say that of arithmetical progression, as being the most simple. The progression then will consist of eight terms, the sum of which shall be equal to the length from the center to the fourth step. Suppose that its development is 66 inches, a length composed of the breadth of three fliers, 4 5 6, namely 36 inches, and the sum of the widths of the ends of the five winding steps, 7 8 9 10 11, namely 30 inches,

Subtracting from	66	inches.
The width of eight steps of the same width as the winders	48	"
There is obtained the difference	18	"

from which is to be furnished the progressive increase to the steps as they proceed from the center to riser No. 4. Suppose these increments to follow the law of the natural numbers 1 2 3 4 5 6 7 8, the sum of which is 36, divide the difference 18 by 36, and the quotient, 0·5 inches, is the first line of the progression, and the steps will increase as follows :

The end of step No. 11	= 6.5
" " 10	= 7
" " 9	= 7.5
" " 8	= 8
" " 7	= 8.5
" " 6	= 9
" " 5	= 9.5
" " 4	= 10
The sum of which is	66

These widths, taken from a scale, are to be set off on the line of balusters, and from the points so obtained lines are to be drawn through the divisions of the center line. It is easy to perceive that by this method, and by varying the progression, any form may be given to the curve of the string.

The graphic method, however, now to be described, is preferable to the method by calculation, seeing that it is important to give a graceful curve to the development of the string.

Let the dotted line *s m p*, Fig. 3, No. 2, represent the kneed line made by the first division of the stairs in the lower part, corresponding to the nosing of the fliers, and the upper part, *m n*, to that of the winders. Bisect the line of the winders *m n* in *p*, and raise a perpendicular, *p i*. Then set off *m s*, equal to *m p*, and make *s r* perpendicular to *s m*. The intersection of these two perpendiculars, *s r* and *p i*, gives the center of the arc of a circle, tangential in *s* and *p* to the sides of the angle *s m p*. In like manner is found the arc to which *p n*, *n o*, are tangents, and a species of cyma is formed by the two arcs, which is a graceful double curve line without knees. This line is met by the horizontal lines, which indicate the surface of the treads, the point *p* being always the fixed point of the center step, the twelfth in this example. Therefore, the heights of the risers are drawn from the story rod to meet the curved line of development, *s p o*, and are thence tranferred to the baluster line on the plan.

Fig. 2.—Nos. 1 and 2 show the plan and elevation of a well hole stairs, with a landing in the half space. The well hole is here composed of two circular quadrants connected by a small portion of straight line ; this figure is not so graceful as the perfect semicircle in Fig. 3, No. 1, but it allows more room on the landing.

Plate XC., Fig. 1.—Nos. 1 and 2 are the plan and elevation of a geometrical stair, composed of straight flights, with quarter space landings, and rising 15 feet 9 inches.

The first flight is shown in Fig. 1, No. 2, partly in section, exhibiting the carriage *c c*, T the trimmer joists for quarter space, and V the trimmer joists of the floor below, with the lower end of the iron baluster fastened by a screw and nut *d*, at the under side of the trimmer joist V.

Fig. 2.—No. 1 exhibits the plan and No. 2 the elevation of a geometrical stair, with straight flights connected by winders on the quarter spaces.

Insurance that Insures.

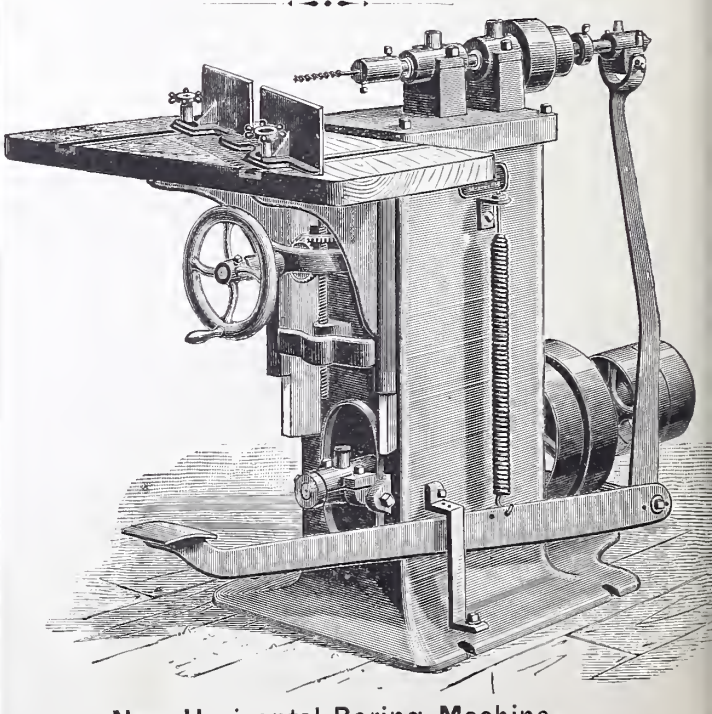
We can think of nothing less valuable than insurance that does not insure ; and well would it be for the public if investing in it implied nothing worse than a waste of money. In general the man who buys insurance, if it is insurance proper, buys a good and an indispensable thing. He gets a good bargain. Insurance is something he cannot well do without. The money values of property and life are well defined, readily expressed in figures. The individual may accept to assume the chance of loss himself, or, by the payment of a certain sum, throw this responsibility on others.

Unfortunately, the insurance which does not insure is rendered attractive by the promise of its cheapness ; and its chief element of mischief consists in the fact that it takes the place of insurance that does insure. The day of loss comes, a producing life drops out, the policy is not paid and a family is left destitute. We have not the statistics at hand ; but it is safe to say that during a year past millions of dollars have been paid for what was supposed to be insurance, every dollar of which has been hopelessly lost. The particularly sad feature of the case lies in the fact of the loss of insurance. To the survivors of men who died, who each paid his small sum of money, the loss is trifling ; the loss of insurance to the families of the men who died is something too terrible for words to express. In general they lost their all.

Inasmuch as insurance that insures promises a certain indemnity against loss, it necessarily follows that the price charged must be in proportion to the risk undertaken ; and, as a business procedure, it would seem best that capital should sell insurance at a fixed price, the business thus being put on a plane with all other kinds of business. And yet a thousand and one companies exist, without capital, with no specific premiums charged, and continue to sell what they call insurance, despite the fact that the pledges of co-operative companies are outstanding at this moment to the amount of millions of dollars, not one dollar of which can ever be collected. It is a sad record, and proves most conclusively, however attractive any mutual benefit association may seem to be, that it is far better to insure in a company that furnishes absolute indemnity.

Our readers can get a pretty clear idea of how legitimate insurance is conducted by referring to a recent statement of the Travelers Insurance Co. which we publish elsewhere. Let them note the solid assets of $6,441,158, and a surplus of $1,655,732. There is nothing suggestive of uncollectable assessments, and consequent unpaid policies, in these figures. Here is an insurance business conducted on business principles. This company has paid for injuries by accident, since it began business, the enormous sum of $5,077,000, and for losses in its life department about $2,000,000, or more than $7,000,000 in all. A policy in the Travelers means insurance, real property, something to go to sleep on, something to write down in a will ; and any co operative insurance compared with it is

"As moonlight unto sunlight, and as water unto wine."



New Horizontal Boring Machine.

The above cut represents a new boring machine manufactured by Mr. Frank H. Clement, of Rochester, N. Y. The frame is hollow and cast in one piece. The spindle is of cast steel, 1¼ inches

netian red, as above. A more difficult process is as follows: Upon an orange ground run in with vandyke brown, burnt sienna, and rose pink (ground in water), thinned with beer to about the depth of color required. Soften it slightly all over with the badger's hair softener, then take a piece of Turkey sponge and wipe some light streaks the way of the wood, and let them slightly fold over so as to have somewhat of a Honduras appearance, then soften up and down rather smartly at first, and gently after, to give somewhat of a finished appearance, and when to be left for Honduras stipple all over with the ends of the badger, and it is done. But if Spanish is intended, after wiping out with the sponge and softening gently the way it is sponged, then very gently soften across, then take a chisel-edged camel-hair mottler, well soaked and wiped clean on the dry sponge, and dot it with the corner down the edges of the sponge marks, and here and there; then holding the mottler between the thumb and fingers, roll it between two or three of the dotted parts, and soften immediately, and observe the effect, avoiding the objectionable parts next time, but keep the figure towards the center of the panel and the sides plainer. Take care that it is all left soft. When dry take a mahogany hog's-hair overgrainer, about four inches wide, and a little of the same color, thinned with water, and work it up together in a saucer, and pat it at the side so as not to take too much color, then with a coarse haircomb comb the overgrainer out and draw over the work, carefully following the sponging; then very slightly soften towards one side, so as to raise the grain very slightly, and when dry it is ready for varnishing.

Furniture of the Ancients.—It is curious to notice how much furniture, like architecture, speaks in plain language the history of a country. As nations increased in wealth and civilization, the luxury and gorgeousness of their furniture increased. The chairs used by the Greeks were elegant in form and graceful in design, and of materials varying in costliness according to the means of the owners. In the examples shown on ancient gems and basso-relievo, we see the straight-backed chairs, or the thrones of their gods, all more or less like the high-backed chairs of the Elizabethan period.

The various discoveries of paintings on the walls of buildings in Thebes and neighboring districts, and at Pompeii and Herculaneum, give us a very fair idea of the furniture of ancient Egypt and Italy. The Egyptians, undoubtedly, had handsome inlaid seats of various kinds, made of ebony and other rare woods, and often covered with rich stuffs, sometimes with leather, fancifully decorated. The legs were carved into the resemblance of those of animals, and sometimes would seem to be solid and painted with figures of captives, indicating a degraded position. The pillows would seem to have been of wood hollowed for the head; the tables were of all forms, generally circular, as being more social and comfortable; and, so far as we can ascertain, the furniture of ancient Egypt was more or less like that of the present day, while modern Egypt is content to have an Oriental form of arrangement, in which low divans and mats form the principal items.

Fashions in Wall Papers.—Wall papers, dados and friezes are especially adapted to harmonize with upholstering fabrics. For dining-rooms and libraries a wall paper in English-Gothic style shows blocks of embossed gold alternating with medallions of a drab ground and tall golden lilies and sprays of olive green. A cloth-of-gold embossed ground has designs of pale-olive shaded roses and butterflies; the dado has a gold embossed background set in alternate panels of griffins, jars, and a *fleur-de-lis;* the frieze is divided in three parts, and shows the fable of the stork and fox in browns and dark red with an outlining of white, and black, and gold. A drawing-room paper has a gold embossed ground covered with shaded white flowers and graceful vines trailing over a trellis of white and gold. A light drab ground has golden lilies and curving leaves drifting over it. The frieze has a sage ground, with flowers in warm brown shades; arabesques and scrolls and leafage cover the gold and drab ground of the dado. An ashes-of-roses ground is blocked in gold and white, and gold with flamboyant traceries in re-relief. For a hall the same landscape designs and colors are repeated, as described, in crepe cloth drapery. Another style for halls has a background blocked with drab, pomegranate red, and gold outlined with olive; the dado is three feet from the floor. For chambers and dressing rooms wall papers have ivory-tinted grounds, where long, graceful vines of morning glories, pink, purple and blue, drift across; here and there a cluster of crumpled pinks mingled with pale harebells and nodding columbine.

England imports some 10,000 tons of cork per annum, and the quantity is yearly increasing, notwithstanding the introduction of many stoppers and substitutes for corks, such as plugs of wood whose fibers have been specially softened for the purpose, india rubber and other materials. The French government are giving special encouragement to the plantation of the cork oak in Algeria, and the same thing, no doubt, will be done in Tunis. It is said that the tree will grow equally well in India, Central America, the West Indies, many parts of Africa and Australia, and in the South Sea Islands, and the foundation of a profitable industry might be established by introducing these trees and starting their systematic cultivation.

Preliminary to 1883.

Readers of the Builder and Wood-Worker! When in other years we have called on you to stand by this journal, and guard its interests, you have responded.

We call again. The work that lies behind us we are not ashamed of. It is for you to say whether you will put upon it the stamp of your approval by continuing your own subscriptions and commending the Builder to your friends. Other journals are in the field, of a somewhat similar class, every one pressing its claims, some of them, too, possessing the especial and all-inviting merit of cheapness, and it is for you to decide whether you will stand by your old friend.

Well, we have really no doubt but that you will stand by us. A backward look over the illustrated pages of the Builder and Wood-Worker for a year past, or for many years past for that matter, ought to satisfy any one that no better goods are in the market, and none are cheaper. People usually buy where they can get the most for their money. We don't mean to be undersold.

But what we most fear is that our old friends may neglect sending in the subscriptions of other parties. We want to add largely the coming year to our subscription list. We can easily double the number of names on our books if our friends will give us a lift. Will they keep the matter in mind and begin the canvass now? A list of premiums will be published next month; in the meantime we will forward the paper for a year and three months to all who subscribe in this month of October. The price is $1.50. The paper is richly worth it, and any cheapening of price would imply a cheapening of the goods. Cash commissions will be paid where the parties so desire. Let the good work begin this month.

[It will give us pleasure to have our readers take a part in this Department.]

N. T.—Read what is said under the head of "Insurance that Insures." This is the best answer we can make to your question. We know nothing of the society you refer to, more than that it is one of a thousand similar concerns out of which nothing in the way of a certainty can be counted on as coming. It's like a lottery. Your family might get something in case of your early death. If you live as long as you ought to, and will by taking proper care of yourself, barring accidents, you can hope for nothing from such a society. Spend your money for insurance that insures. This is our advice.

R. D.—You ask too much when you ask us to say which is the best door hanger. You see, just where this paragraph commences the editor laid down his pen and started for Canada, to get a few weeks' rest, and the publisher at once took charge of the ship. Now how can a publisher take any interest whatever in "hangers" when the manufacturers of these goods stubbornly refuse to do any business with him. Of course he could write up the different manufacturers of this class, and inform the public through the columns of his paper, of the merits of their goods, and write private letters to inquirers like yourself, but then it would not be business. This sort of thing don't pay. Some of these gentlemen declare that they reach every buyer in the country by circulars. Well, if they can stand it we can. No, until some enterprising "hanger" man knocks at the door of our advertising columns we refuse to be interviewed. He must come in by the door into the sheepfold. It costs money to run a paper like the Builder & Wood-Worker. Wait? Did some manufacturer ask you to write that letter, and does that explain the name at the close?

C. C. B., Nebraska City: You say you have a fair knowledge of the elementary principles of Architecture, and would like to know what books to read to continue the study with profit. We scarcely can tell what to recommend, as we do not know how far your "elementary knowledge" extends. We suppose you to be a working carpenter, with a fair, common school education, and possessed of some knowledge of drawing, &c. In this case, we should say, study the following works: Gwilt's Encyclopedia of Architecture—price $20.00; Hatfield's American House Carpenter—price $5.00; Hatfield's Transverse Strains—price $6.00. These will give you a good idea of constructive architecture. The three or four architectural and building journals published in this country should be on your desk at all times, as they contain much that will be of the greatest service to you, besides keeping you posted on current architectural matters. We should also recommend you to procure a copy of each of the following works, viz.: Drawing Instruments, and their Care and Uses—price 25 cents; Warren's three elementary books on Drawing—$1.50 each. You can get good drawing instruments at a cost from $7.50 to $25 a set. Sticks of india ink may be obtained for 50 cents and upwards. Lead pencils, suitable for drawing, are worth from ten to twenty-five cents each. Any of these books, instruments, inks or pencils can be obtained from this office.

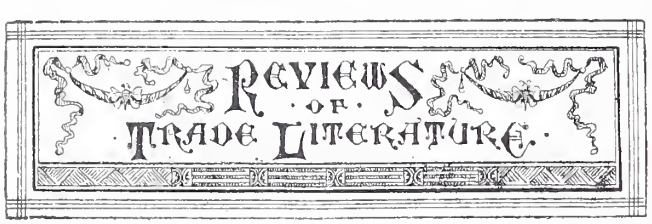
R. N., Utica, N. Y.—For stenciling on distemper color, mix up the dry colors in a vehicle compounded of one-third Japan gold-size and two-thirds turps, care being taken that no oil gets among the color, as it would cause an oil mark to "strike." By using this paint for stenciling on a distemper ground the work can be done clean and rapid, as the Japan color will not "clog" the stencil as does size color, thereby saving a lot of work in cleaning the stencil plates. This vehicle is also the best one to use for lettering hollands, shop or office blinds, as by using it the unsightly oil marks often seen around the lettering are avoided. We cannot advise you as to colors; you will have to be guided in this matter by your own taste or by the color of the furnishings of the room you wish to decorate.

M. A. S., Detroit, Mich.—We cannot give you much advice regarding the proper method of arranging your furniture. Neither can we offer reliable instruction for making alterations in your furniture.

We offer the following, as it may contain suggestions that may aid you and others similarly situated, in making improved changes in a household: "You have a quantity of old-fashioned, perhaps ugly, furniture; and cannot afford new. Well, arrange it skillfully; and to do that, think over it—put one thing here and another there. Subdue the color where too strong. You must have often found the effect of a room full of old odds and ends of furniture, arranged by a lady of taste, far more fascinating and pleasant to live in than one furnished brand new by the most fashionable upholsterer. Don't choose a bad color instead of a good (that will each day delight your eye) because the bad costs a few cents a yard less; or cover your walls with mud-colored paint under the impression that it will not show the dirt; the consequence of which ingenious and almost universal custom is that the walls never do look clean. Don't put big pictures or enormous mirrors in little rooms. Have variety and joyousness in your colors, but don't thrust on the eye great masses of strong, bright colors that can only fatigue and weary it. Don't! oh, don't have cheap imitations. If you can't afford good carved frames, have them of plain gold, and not of gilt composition squeezed on to a wirework foundation. If you have ornamental work of any sort, look at it carefully, and see if it have any grace of design and skill of execution that look as if the man who worked it, or who designed it for machine production, had any thought or feeling for what he was doing. And if you want to tell good work from bad, I don't know that you can apply a better touchstone than this—whether there be evidence of care, skill, and thoughtfulness in design, for be assured no ornament can be good without this. If you have ugly things, put up with them, and by ingenuity and taste make the most of them, but be careful how you buy new things. Don't be taken in by the upholsterer, and think everything of a new fashion must be all right. Because some one thought the natural grain of wood prettier than the painter's simulation, don't think that all the furniture that shows the grain through a nasty sticky-looking glaze must be good art, or that coarse perforations of quatrefoils or other patterns resemble anything done in the days of Gothic art; or because old oak furniture is charming, that modern stuff varnished to a permanent nasty yellow color must also be good: or because tiles in their places are good things, that a gaudy-looking, glassy-surfaced tile looks well let into a piece of oak, and gives a pleasant harmony of color and surface."

A. J. K., Dunkirk.—We cannot furnish anyone sample copies of the *Journal of Decorative Art* gratis. This journal is published in Manchester, England, and as a number of our subscribers have asked, like you, for sample copies, we avail ourselves of this method to inform you and them that the better way will be to send to the publisher's office for sample copies, and enclose twenty-five cents to pay for same; or remit that amount to us, with address, and we will forward it to England.

W. R., Buffalo.—The best scroll saws that we know of for general amateur purposes are manufactured by W. F. & John Barnes, Rockford, Ill. The Velocipede saw made by this firm will do the very finest work, or can be used to cut stuff two or three inches thick. Yes; the item in the August number, in this column, referring to steel squares, is rather badly mixed. Instead of reading "gradnated," it should be "gradated." Printers sometimes make editors say very strange things.



We deem it our duty to keep our readers advised of the publications of all works that will in any way interest them; and, with this object in view, we intend each month to give a lengthened notice of such new books and periodicals as we may think will be of service in this direction. We shall not only give the character of the book, and price, but will in many cases give extracts from the works reviewed, so that our readers may be enabled, to some extent, to judge of the quality of the books for themselves.

[N. B.—All books reviewed in this column can be obtained from the Builder and Wood-Worker office at publishers' prices. Authors and publishers are requested to send in copies of works intended for review as early in the month as possible.]

(Once upon a time some wicked boys worked their way into a pulpit and neatly pasted a copy of "Old Grimes" into the hymn book. It so happened that the minister opened on this choice bit of sacred poetry, read it, and taking off his spectacles said, "Brethren, the hymn is new to me, but its thar between the lids of the book, sing!" I find the following book reviews, left by the editor, who is on his vacation, and there is no place for any of them but under the head of "Trade Literature."—C. D. L.)

Illustrated Catalogue; J. L. Mott Iron Works. This is an elaborate work, executed with excellent taste and seemingly without regard to cost. It is the usual custom of this house to spare no pains in setting before its patrons the best executed illustrations obtainable, of its manufactures, but in the present instance it has beaten its past record. We have seen nothing for many years, in the shape of an illustrated catalogue, that compares with this in that perfection of detail which is so desirable where the purpose is to represent truthfully an article of manufacture; so that a clear and comprehensive idea is obtained before seeing the article itself. There is a judicious use made of color in most of the cuts while those in simple black and white are neatly drawn and well engraved. The work contains about two hundred illustrations of grates, fenders, fireirons, etc., and shows what grand progress is being made in art manufactures.

Hints on Estimating.—New Edition.—We have printed and sold an edition of 10,000 copies of the above treatise. A most notable sale. On the 15th of the present month we shall issue a new edition, beautifully printed, bound in paper covers, and adapted to the pocket. The price charged will be ten cents a copy. This is one of the handiest little books ever turned out, as it contains a whole volume of useful information. Every builder and every carpenter should have it. In sending for this work postage stamps will be accepted.

A handsome Catalogue comes to us from Louisville, Ky., issued by Messrs. Fischer, Leaf & Co., showing designs for marbleized iron mantels, stoves, hollow ware and grates. The westward trend of manufactures is quite noticeable in these days, nor is there any lack of enterprise shown. The West, too, seems to keep step with the East in catering to the art tastes of a great people, and neglects no means for rendering its manufactured goods attractive and therefore salable. Well, fortunately, there is demand enough for the West and the East, so let there be a generous rivalry but no jealousy.

Nana.—By Emile Zola.—Peterson Bros., Publishers, Philadelphia. One dollar. Cloth.

Nana is a careful study of the life and manners of a certain class of people, ordinarily designated as those of elegant leisure. The heroine is a variety actress, whose face and figure create a furore among the fashionable Parisians, who follow her on and off the boards as if she were a veritable queen. Her life is a life of perpetual excitement and uninterrupted intrigue, portrayed with an intensity of graphic delineation which is almost terrible to realize. Zola's purpose is, as he himself says, to paint this class of women as they exist in real life, and any one who reads the work will not hesitate to declare that he has attained a full measure of success in his attempt. Although the work deals with vice in all its hideous reality, Nana throws no glamor over self-indulgence, nor lends the least charm to natures essentially false and corrupt. The writer's object is to make vice repulsive, believing that thereby it will lose the attractiveness which has been imparted to it by certain writers of a less realistic school.

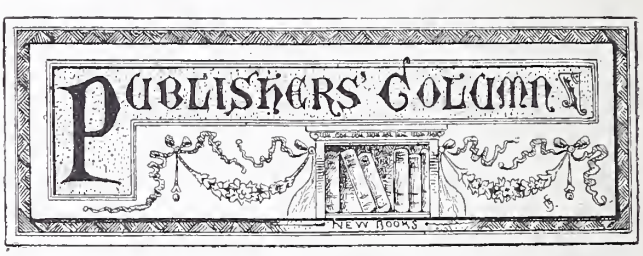
Some critics object to this work because, as they assert, of its immoral tendencies. We have read the book, but have failed to find anything in it that we would care to have changed. Indeed, like other good stories by the same author, it contains a moral that cannot help but leave a good impression when rightly read.

Camille.—By Alex. Dumas. Peterson Bros., Publishers, Philadelphia. Price, cloth, $1.25.

Very few novels have been so widely read as the one before us, and no wonder, for a more fascinating romance was never written. It is natural, powerful and touching, and, at the same time, it conveys a moral lesson that can never be forgotten. The reader recognizes Camille's inherent good qualities despite her reckless life, and is irresistibly impelled to sympathize with the beautiful creature caught in a whirlpool from which there is no possible escape, and simulating light-heartedness while consumption is gnawing at her vitals.

Manual Element in Education.

We made some mention of this little work last month, and strongly recommended it to those persons who were in any way interested in technical education. Since then we have carefully looked over its contents, and, as a consequence, are more fully persuaded that some of the hints given therein "On Technical Training Schools" are useful and valuable, and might be adopted by most of our schools with success. Mr. Runkle advocates, so far as he advocates any system—a thorough teaching of mechanic arts, with drawing and a knowledge of the uses of mechanics' tools. He seems to have but little faith in the efficacy of "trade schools," or schools for teaching the technical details of specific industries. While we do not fully agree with him on this point, we readily submit that a general course of "technical training" in our schools would perhaps give more satisfactory results, it would not turn out such expert and finished workmen as the "special trade schools." Those interested in this subject should peruse a copy of the Manual.

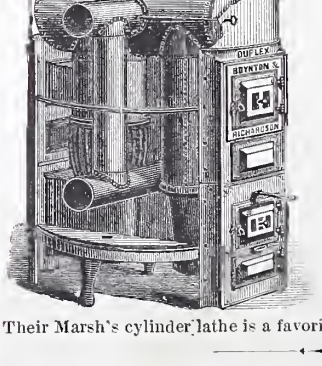


☞ A charge of seventy-five cents a line will be made for all notices in this column, for each and every insertion. Copy of notices must be sent to this office on or before the 20th day of each month to insure an appearance in the following issue.

There is no question as to the fact that W. F. & Jno. Barnes, of 2016 Main street, Rockford Ill., manufacture the most complete outfits of foot and hand-power machinery, for actual workshop use that have ever been placed in the market. These machines are now offered, as the result of ten years' experience in this line, and no doubt will exist regarding the value of these machines to mechanics, after reading letters from parties who are using them.

Their advertisement appears in another column, and all interested are invited to send for catalogue. They will also be glad to give any particular or special information that may be desired.

Patent Duplex Furnace.—Messrs. Boynton & Richardson, as will be seen by their full page advertisement, in this issue, have introduced a new furnace called the Patent Duplex. There are two fire pots in this new device, which can be used singly or together. Ordinarily, people who use furnaces are troubled with too great an amount of heat in the early autumn or late in the spring; that is to say, if the furnace used has sufficient heating capacity for extremely cold weather. This difficulty would seem to be entirely obviated by this newly patented device. We recommend to all who are interested in the question of furnace heat for dwellings to send to Messrs. Boynton & Richardson for their descriptive pamphlet, in which the merits of the invention are fully set forth.



The Battle Creek Machinery Co., of Battle Creek, Mich., are meeting with considerable success in the sales of their Lathes and other manufactures. They have recently sent consignments to Russia, Sweden, Australia and South America, and are worked to their utmost capacity to keep up with their orders. Their Marsh's cylinder lathe is a favorite with every one that has used it.

Send seventy-five cents to this office for a copy of the "Steel Square and its uses." The best Book for young workmen, in the market.

Send ten cents to this office for "Hints on Estimating."

The Builder & Wood Worker

A JOURNAL OF INDUSTRIAL ART.

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CHARLES D. LAKEY, PUBLISHER. FRED. A. HODGSON, MANAGER.

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Subscriptions to Great Britain and the Continent of Europe, Australia and Japan, $2.00; China, Sandwich Islands, Mexico, and Cuba, $3.50; South America $4,50.

N.B.—Persons remitting money to this office through the post are requested either to procure a post-office order or to register the letter, and address it to the publisher, CHARLES D. LAKEY, *176 Broadway, New York, to whom all letters of a business character should be sent.*

VOL. { OLD SERIES, XVIII. / NEW SERIES, IV. } NOVEMBER, 1882. { WHOLE NUMBER, 182 / NEW NUMBER, 11

NOTWITHSTANDING the fact that the BUILDER AND WOOD-WORKER to-day is the cheapest and best journal of the kind published in the world, at $1.50 per year, we intend to reduce the price to ONE DOLLAR A YEAR from this out; and, although we make this reduction, we do not intend to lower the standard, or practical value of the journal; indeed, we have made such arrangements for future issues that we can safely say, that good as the paper has been in the past it will be better, if possible, in the future, and will contain just as much matter and as many illustrations as heretofore. To be able to reduce the price of the BUILDER AND WOOD-WORKER to ONE DOLLAR a year, without reducing the size of the paper or the number of illustrations, is due to the facts that our circulation has more than doubled during the past two years, and that the management of the paper has been placed in the hands of energetic parties, who intend to push it into every city, town, village and hamlet on the continent, so that every person whose interest we represent SHALL KNOW of the existence and usefulness of "Our Journal." For fifteen years the BUILDER has been kept well to the front, and has held its own under many difficulties, and it is pleasing to put on record, at this age, that the paper to-day is in a better position than at any previous time, thanks to the thousands of patrons, many who have stood by us from the very first. We fully believe we have on all occasions given to all our patrons full value for their money, and as in the past so will it be in the future. We want no man's dollar if he thinks he does not get more than its value in the ninety-six full-page illustrations we issue every year, not mentioning the text and other illustrations. We know our own value and we know that thousands of our readers know our value also; hence our long life and continued prosperity.

THERE is generally considerable difficulty in selecting a plan that shall be quite nearly all we desire in a dwelling-house, without going beyond our means. We know what is beautiful and convenient, but we continue to find ourselves hampered in the most provoking way by want of the funds necessary to carry out our ideas.

In this case we must commence with the bare necessities subserved by a house.

The first is shelter. This requires but one room, a very simple arrangement, and one frequently resorted to in frontier life. Passing this point, we add closets, bedrooms, a bathing-room, and then a dining-room, and last of all a parlor. We should keep this order in mind in the development of our plan. A house is, first of all, a physical necessity, and becomes a matter of elegance and luxury step by step as our means will afford. This view is not opposed in the least to that in aesthetic in buildings; it only acknowledges the existence of laws, which must be observed, and in the ignoring of which many a family is kept from enjoying the substantial comforts of a little house of their own. Let your house be a growth of that which is essential and fundamental. Look upon your dwelling as an apparatus, devoted to the health and comforts of its inmates, "the girl" as a part of your family in a larger sense. Seek to secure an arrangement by which the greatest amount of "housework" can be done with the fewest steps, and with the least exposure of whatsoever is inelegant or offensive; for however refined we may be, there is still a great deal that is of this earth, earthy, and which must not be allowed to give offense when privacy will prevent. These things carefully carried out, and a little propriety in coloring and ornamentation being observed, the whole will have that kind of beauty which answers to the best definition, namely, beauty is the perfect adoption of form and color to use. There must be a harmony between your plan and your building site; there must be a fitness not only in regard to appearance, but especially in regard to the direction of the winds and ranges of bleak winds, and always afford a comfortable shelter from the scorching heat of the midsummer sun. If the building site has been selected, it may be difficult to meet these conditions in the plan, or if the plan has been adopted, it may be almost impossible to find a suitable site in the desired neighborhood, and the final decision may be a compromise. But however this may be, have a well-defined plan, and follow it.

SEWER GAS! What is it? Sewer gas is simply made up of what chemists term "sulphuretted hydrogen." This is a poisonous gas, and spreads disease, misery, and death wherever it gains entrance, be it into a public hall, church, or private dwelling. We do not believe, however, that this deadly agent is as rampant as some writers would have us believe: in fact, we are con-

fident that half the ailments attributed to this source do not result from it at all, but from other causes. While we admit that the evil is great, and that thousands suffer from the effects, we are disposed to the opinion that the terms "sewer gas" and "malaria" are employed to cover the inability of the M.D. to properly diagnose his patient's complaint, and that attributing the ailment to the mysterious agency of this subtle gas serves the dual purpose of giving an air of smartness to the physician and covers his retreat from a position which he is unable to cope with. The presence of sewer gas may always be detected in an office, room, or bath if the woodwork has been painted with white lead, as the sulphuretted hydrogen, or sewer gas proper, attacks the lead and turns it black almost at once. When painted work in a room turns black or gets a leaden color, then beware, for a deadly foe is at hand, and the sooner you annihilate it the better for your peace of mind. A little watching will soon convince you whether sewer gas is present or no. If it is, discoloration of painted work will rapidly take place and hoist the signal of danger; if not, then the paint will retain its original color, subject only to the darkening process which comes of usage and exposure.

THE modern London house is a surprise to an American. If one take the pains to go through five or six hundred South Kensington houses, all built within the last two years, vacant, and kept in stock for future buyers, he will not take kindly to the way in which English mechanics do their work. Floors are badly laid; strange to say, there is a general shrinkage in the woodwork, indicating the use of unseasoned lumber, and the hardware is of a quality that is never used in this country, except in houses of a very cheap class. The English builder seems to think that almost any kind of hardware will answer, so he uses locks that in six months or a year are a source of constant vexation. To make matters worse, the work of adjusting hardware to its place is badly done; doubtless the result of piece-work at low prices. These remarks apply to houses that are held at a valuation of $100,000, and on leased ground, and the writer does not speak from hearsay, but from observation.

HOW the star of empire takes its westward way is pretty well indicated by the growth of Chicago, which now has a population approximating 650,000 people. Many who are still in the prime of life remember what is now the great city as the small village. Well, this is, indeed, a wonderful country, and it is difficult, even for Americans, to keep informed as to the details of its mighty progress. Unfortunately for the architecture of Chicago, it is doomed to the use of bituminous coal, which, as manufacturing increases, must blacken the beautiful stone on which the city chiefly depends for its fine façades.

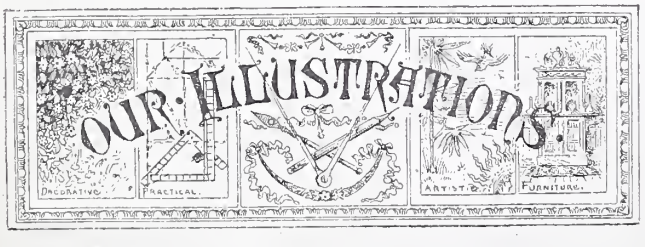


PLATE 81 shows plans and perspective view of a country house, also sketches of sitting and dining-rooms. The sketch of mantel shown in sitting-room is very pleasing. The plate is furnished us by Mr. Dewson, of Boston.

Plate 82 shows four elevations of the cottage shown on the preceding plate. This is a useful contribution and may be followed by the workman, as the drawings are all made to scale.

Plate 83 illustrates the method of building frame of cottage shown in preceding plates. Details are also shown of veranda, gables, etc. Almost any intelligent carpenter should be able to put up and complete a cottage of this kind, having these three plates for his guidance. The architect, Mr. Dewson, does not state what the cottage will cost, and this is perhaps as well, for the cost would vary in different places, and estimated costs at one point would be misleading and confusing in another.

On Plate 84 we exhibit a design, plan and sections for a village church. We are sure some of our country readers will be pleased with this plate, as it is just what we have been asked for on several occasions of late.

The drawings were furnished us by F. J. Gradevent, architect, Syracuse, N. Y.

Plate 85 shows a number of very useful details designed by S. M. Howard, architect, Wheeling, W. Va.

Plate 86 is in connection with the "Free Will Series," contributed by Mr. Dewson. It requires no explanation.

Plate 87 shows a number of designs for chairs, also carving patterns for some of them. This plate is taken from the *Cabinet Maker* (English).

Plate 88 shows two sections of drawings for stairs. Full explanations are given in another column.

Last month our printers made us say, when referring to last plate of that month, Plate XC. It should read Plate 80.

Strength of Timber.

TIMBER from the heart of a tree is stiffer than the sap-wood; that from trees of average age than that from old trees; well-seasoned timber than green, and generally the stiffness increases with the weight, or rather the specific gravity. The same rules apply to the strength of the timber. If the quantity of timber be the same, the stiffness of a beam will increase with its depth, but care must be taken not to make it so narrow as to incur the danger of tipping over. Hence, to determine the size of a beam to be fixed at both ends a series of rules are given, one of which will serve as an example.

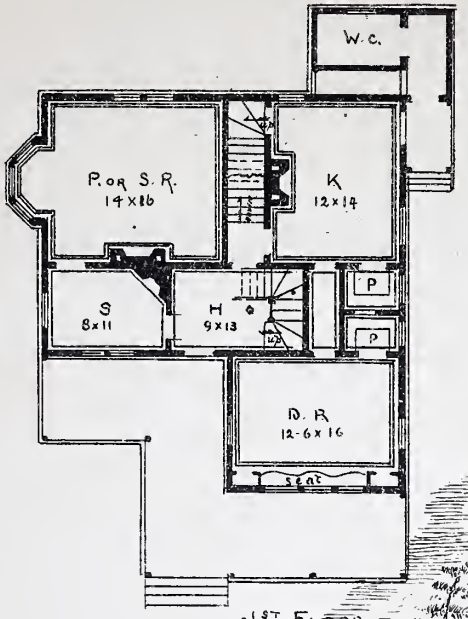
Rule.—When the breadth, length and weight to be sustained are given, to find the depth—Multiply the square of the length in feet by the weight in pounds, and this product by a number varying according to the kind of timber (in the case of good white pine, it would be about ·025). Divide the product by the breadth in inches and the cube root of the quotient will be the depth in inches. This rule is given in Tredgold's Carpentry, in which may also be found a large number of tables, showing the resistance of various kinds of timber. The rule given by the author above quoted, for finding the breaking weight of a piece of timber is as follows: Multiply the breadth in inches by the square of the depth in inches. Divide the product by the length in feet, and the quotient, multiplied by a "constant," depending upon the kind of wood, (for white pine about 650), will be the weight in pounds. If the timber be supported at one end only, but one-fourth of this weight would be required to break it. If the weigth be uniformly distributed over the beam, it will require twice as much to break it as if the load is collected at the middle.

A force tending to compress a pillar or other piece of timber may operate in several ways according to the height and thickness of the timber. If its height be great in proportion to its diameter, it will bend, and if the weight be sufficient, break at the middle. This will be the case if the height be greater than thirty times the diameter. If, however, the pillar be short, it will be crushed. As concerns its power of resistance to crushing, the seasoning of wood makes a great difference, as wet wood

A COUNTRY HOUSE

PLANS AND PERSPECTIVE

Edward Dewson.
Architect & Art Designer.
Boston.



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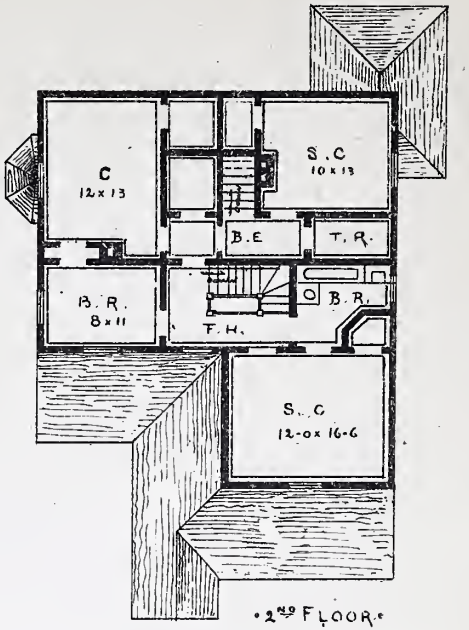

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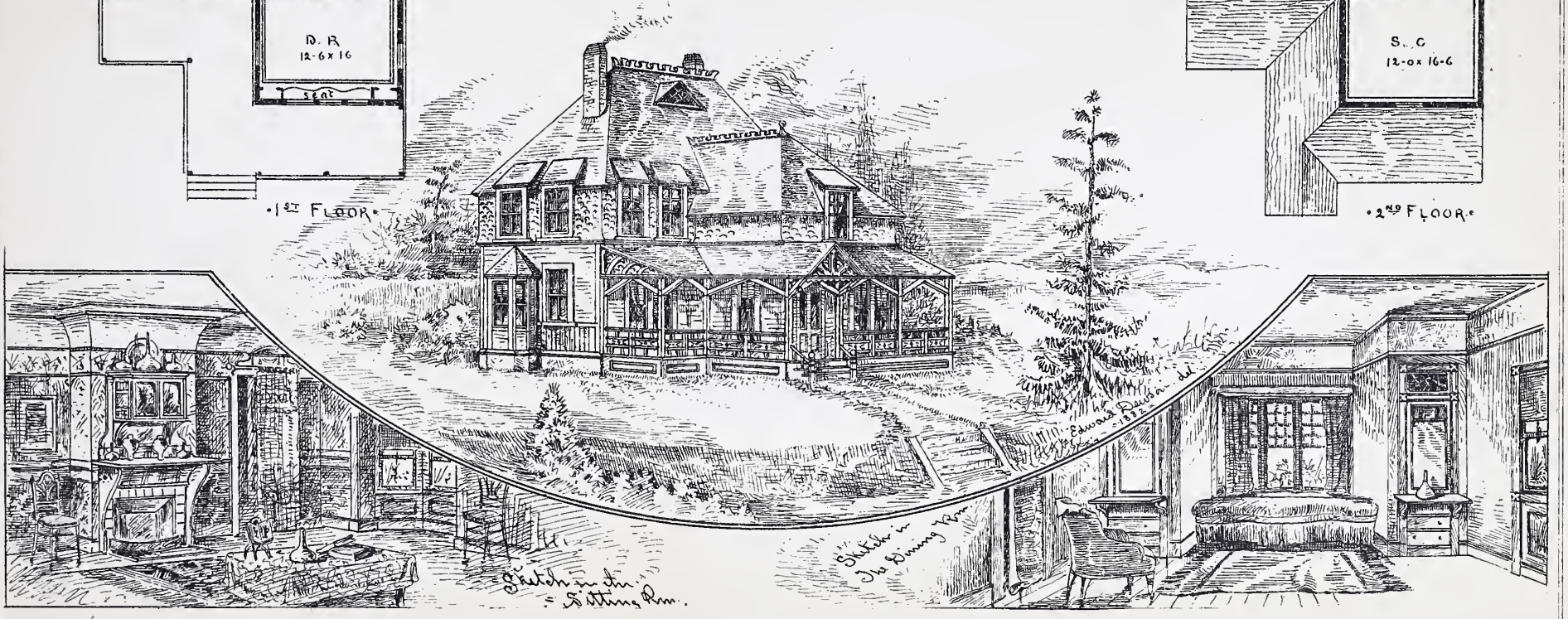


has little more than half the strength of dry. For strength in this particular, good oak is to be recommended ; after that pine. The strength of a long pillar is about three times as great, if the ends are flat, as if they are rounded. Giving pillars a bulge at the middle somewhat increases their strength. Of course, short pillars are much stronger than long ones. A column of pine 14 inches high and 14 inches square, has been known to support a weight of nearly a thousand tons.

If wood be strained lengthwise, its power of resistance will vary directly as the area of its cross section and inversely as the length of the piece and the force employed. This holds true as long as the elasticity is uninjured. but after that is impaired, the strength of the timber is materially less. The weight required to overcome the cohesion of pieces of oak about a foot in length with a cross section of one square inch varied between 18,000 and 20,000 pounds. A similar piece of pine was pulled apart by a force of about 13,000 pounds.

Florida Finishing Woods.

A CORRESPONDENT of an exchange gives the following interesting particulars concerning woods valuable for finishing or veneers, which are abundant in Florida :

"The close relations which are being established between Florida and other parts of the United States, both by the immense emigration which is tending thither from all quarters for permanent settlement, as well as by the great volume of temporary sojourners from the North and Northwest, will bring to our knowledge, and into use, a great many of the resources of that wonderful and prolific State that have been hitherto unknown in any practical sense whatever. Prominent among these objects is the important one of new and hitherto unknown woods for veneering and ornamental finishing.

"The yellow pine has for some time been well known as a very useful wood for flooring and dimension stuff, bridge and frame timber, but it is now finding its way into the eye of taste as one of the most beautiful of veneering woods. It not only presents a most beautiful surface, but admits of a very high degree of polish as well. I refer to the irregular portions when the grain is not straight, and when the convolution causes a twisting out and in of the fiber, and that is the finest thing in that line that we remember to have seen in any other veneering. The color is a bright yellow and charming from its originality. It also presents a very delightful contrast with black walnut and any of the darker woods. It is getting to be quite an ordinary veneering in the South for such cars as are built there, and it certainly will come into general use and have an extended run elsewhere. Its merits will certainly insure to it a great prominence.

"The magnolia is a very fine finishing timber, not only on account of its inherent beauty, but likewise by reason of the extreme fineness of its grain and its susceptibility of a very high degree of polish. When it becomes known, as it surely must now, it will be in great requisition for all those uses where a high degree of polish and a close, firm texture is demanded. I see that imitation ebony is becoming much used recently. It would seem to me that the magnolia is just the species of wood to make the imitation ebony from. It seems to fullfil all the requirements, and it grows in inexhaustible quantities in the hummocks of Florida, and can thus be produced at very low figures.

"The red or sweet bay is another ornamental wood, which is practically inexhaustible in Florida. It is substantially the same as mahogany, and can be used in the same way, and for the same purpose as the Honduras mahogany. In fact, we see no reason why it should not receive the appellation of American mahogany.

"There is no reason why the finishing and veneering woods of Florida should not also make their advent among dealers in veneerings and the finer finishing woods."

Planer Cutter Heads.

BY J. T. L.

TAKING my text from a well-written article by "Observer," copied by *Wood and Iron* from *Lumber World*, the question "Why do Cutter Heads get out of balance, and what is the best preventative ?" I cannot add anything to it, but may be able to make some suggestions which may help us who are together trying to work out a difficult problem. In the first place owners of mills could do a great deal to help out in this thing, if they were practical workmen themselves ; but in most cases proprietors of mills know of everything else but the running or care of a machine of any kind, and shift all the care and responsibility on the shoulders of the foreman, who generally has as heavy load as he can carry without experimenting on machinery. Every mill of any size should have a machine shop of its own, managed by the engineer, who should be a first-class, intelligent, ingenious mechanic ; fully alive to all the wants and necessities of woodworking machines. He should understand fully the workings of all the machines in the shop, and be able to fit up perfectly any part of which may be lacking or broken, and take a lively interest in keeping cylinder and side cutter heads in perfect balance ; and a great many times such a man can add improvements to a machine which is being used. He should be hired expecially for his qualifications for the place he is expected to fill, and given first-class tools to work with, and be held responsible for everything being kept in order, under the direction of an intelligent, wide-a-wake foreman. I think, as a general thing, proprietors of mills do not furnish such tools as ought to be found in every well-conducted mill. What he says about cylinders being made of cast iron is true, and I would suggest that some one try cast steel* in its place, which would have the benefit of being a perfectly solid mass throughout, and heavier for its size than cast iron ; or to try a forged iron cylinder, which would certainly be a solid mass of stock. As for boring a cylinder, if pains is taken a perfectly straight hole can be made as well as in a rifle barrel, and much easier, because the hole is so much larger. I believe, as he says, that many cylinders run bad because the shaft is sprung in putting in. It is wrong to start with, and no possible fixing can ever make it run right. Some concerns use what I call "hollow-head cylinders," where the cylinder is brass and the shaft has three bearings. The shaft is fitted to the ends, and the center left large so as to fill with babbitt. Now I consider it an exception rather than a rule that under such conditions a cylinder will run well. *More* than ten chances to one on pouring hot babbitt into the center bearing the shaft will be sprung, and no possible turning or tinkering can ever make it right. The shaft should be a perfect fit all the way through.

One thing I would suggest about a cylinder ; the little strip that is put on to form a chip-breaker, I would have it put on with screws instead of rivets, so when it gets worn a new one may be put on without trouble. These pieces should be ground to a perfect edge, and back from the edge should be ground to a curve instead of straight, so offering less resistance to the wood in acting as a chip-breaker. Very often these little pieces become worn, and you find chips driven in under the knife. This is especially the case with hard woods and Southern pine. Sometimes I have thought these pieces should be made hard or tempered like a knife, which I think would make them wear better.

Now in regard to balancing knives—a set may be perfectly balanced and yet be very much out of balance, and here is perhaps where a great many make a mistake. For instance, suppose a set of knives were ground to a perfect balance on the scales, but suppose in grinding, one knife should be ground so the stock should be taken off from one end more than the other, and the end of one knife should be heavier in proportion than the other, the head could be just as much out of balance as though one knife was just so much heavier than the other. To illustrate—only a few weeks ago I saw a man put a bead into a four-sided slotted 8 inch head, and to balance it, he put, what was a perfect balance to the bead in the other end of the head, and in answer to a question said it made no difference where the weight was as long as it was in the head. Very soon he had a hot box and a loose head, and since that time the counter balance has always been put on in the right place, and it is just so with knives. The ends of them must exactly balance each other or there will be trouble.

What "Observer" says about the side cutters is also true, but one great trouble with them is, as a general thing, they are fitted up with too small spindles and too short boxes, especially at the

* What I mean by cast steel is that which is made by a firm in Pittsburgh, who cast steel in any desired form.

top. Were I to fit up a mill for myself, I would never put in a spindle less than 2 inches, and not less than 6 inches bearing at the top, with a special arrangement in the step to prevent it from wearing down. Some machines are notably lacking in this point, and give a great deal of trouble by constantly dropping down. I contend that the pulley on the side cutter spindle should nearly fill the space between the boxes, which causes it to be very much stiffer than a pulley just wide enough to take the belt.

"Observer's" ideas about lubrication are very good, and I would only suggest that, whether we use self-oilers or not, there should be no lack of constant watchfulness. Get yourselves in the habit of looking after bearings every little while, and every time you go near a box put your hand on it, and often make it your business to look your bearings over and see what condition they are in. "Observer" advises the use of pure lard oil, with tallow of good quality in the boxes. I have used, with good success, good lard oil and paraffine, half and half, and for tallow I use the very best suet or raw tallow I can get. I have read "Observer's" article in *Wood and Iron* over a great many times, and I advise anyone running a planing mill to get this article and paste it up where they can read it occasionally, if not oftener. It is good sense all the way through.

Novel Method of Exhibiting Native Woods in the Drawing Room.

[Written for the BUILDER AND WOODWORKER by F. B. Brock, Solicitor of Patents, Washington, D. C.]

DURING a recent visit to the National Museum at Washington, now in the course of being fitted up for the reception of curiosities and other things pertaining to a museum, I was much interested in a collection of ornamental woods from Japan—a gift from the University of Tokio. This collection embodies so much originality and attractiveness combined, with simplicity in the manner of its exhibition, that I cannot refrain writing you on the subject in the hope that some who read this, and whose accomplishments are such as to permit them to indulge the art, may be enabled to beautify their homes without any expense, other than loss of time.

This Japanese collection consists of a series of panel frames 8x12 inches each, a panel being devoted to each variety of wood. The general appearance of the panel is shown by the subjoined sketch. The panel A proper is a thin planed surface (⅛ in. thick) and, in this collection is unpolished, though it is obvious that a polish may be given to the wood. When the diameter of a tree is less than eight inches two or more pieces are laid side by side to give the requisite width, In the sketch here given, the panel is in four pieces, the division lines being indicated in the drawing. The frame B of the panel is cut from the same wood, an inch in width by one-half inch in thickness. The face width of the frame B is left with the bark on, in order to show its formation, and it also forms a pleasing contrast to the panel. At the four corners of the frame are transverse sections C, of the same species of wood of the same depth (⅛ in.) as the frame B, and lying flush therewith. These sections C must be cut from a small limb of the tree which should be approximately an inch and a half in diameter. Their faces should be sand papered or polished.

The artistic preparation of the panel is next in order. It consists in painting, in oil or water colors, a twig and specimen leaves of the same tree from which the framed panel has been made. If the tree flowers, as most of the ornamental trees do, the bud, the blossom, and the seed should be shown by detail views on the panel. Some trees, as the locust, bear seed pods, and these form pleasing subjects to put upon the panel. In case of fruit or nut bearing trees, the specimen fruit and nut may be painted. Even the bugs or worms which infest the tree may appropriately appear.

The name and genus of the tree is provided for in the space marked D, which, in the sketch, is filled by Japanese characters.

In this manner it is possible for the owner of a rural home, with some experience in water or oil colors, to become possessed of beautiful panels of every kind of wood growing on his place and those out of it. They are appropriate for the drawing-room, and form unique and interesting subjects. In the museum they are grouped together in handsome cases where they are much admired.

Stairs.

FOURTH PAPER.

LAST month we exhibited two kinds of geometrical stairs; in the present number we show three other kinds. Those in section 1, are semi-circular in plan, while the stair shown in section 2, is elliptical in plan. The method of framing for the carriage of figure 1, section 1, is shown by the dotted lines and may be easily understood from the plan. Figure 1, No. 1, section 2, shows by the dotted lines how the carriage framing should be done for a stair on an elliptical plan.

The strings for these stairs may be steamed, and bent over a cylinder; or they may have grooves cut into them parallel with axis of the stair, and the grooves filled up with bars of wood carefully glued in, and the whole left to dry when bent to the proper shape.

Another method in making stairs hollowed in the face to the curviture of the well-hole, and setting out as much of the string on each piece as will cover its width, then glueing the staves, edge to edge, without any veneer. This method, though expeditious, is not safe.

Another method is sometimes practiced, when the curved surface is of great length and large sweep, as in the back strings of circular stairs. In this a portion of cylindric surface is formed on a solid piece of plank about three or four feet in length; and the string being set out on a veneer board sufficiently thin to bend easily, is laid down round the curve, with such a number of pieces of like thickness as will make the required thickness of the string-board. In working this method the glue is introduced between the veneers with a thin piece of board, and the veneers quickly strained down to the curved piece with hand-screws. A string can be formed in this way to almost any length by glueing a few feet at a time, and when that dries, removing the cylindrical curve and glueing down more, till the whole is completed.

Several other ways will suggest themselves to the workman, to build up a good solid circular string-board.

RANKINE says that there are certain appearances characteristic of good wood to what class soever it belongs. In the same species of wood that specimen will in general be the strongest and the most durable which has grown the slowest, as shown by the narrowness of the annular rings. The cellular tissue, as seen in the medullary rays (when visible), should be hard and compact. The vascular or fibrous tissue should adhere firmly together, and should show no wooliness at a freshly cut surface; nor should it clog the teeth of the saw with loose fibers. If the wood is colored, darkness of color is in general a sign of strength and durability. The freshly cut surface of the wood should be firm and shining, and should have somewhat of a transluceut appearance. In wood of a given species the heavier specimens are in general the stronger and the more lasting. Among resinous woods, those which have the least resin in their pores, and among non-resinous woods, those which have least sap or gum in them, are in general the strongest and most lasting. Timber should be free from such blemishes as "clefts," or cracks radiating from the centre; "cup shakes," or cracks which partially separate one layer from another; "upsets," where the fibers have been crippled by compression; "wind galls," or wounds in a layer of wood, which have been covered and concealed by the growth of subsequent layers over them; and hollow or spongy places in the center or else where, indicating the commencement of decay.

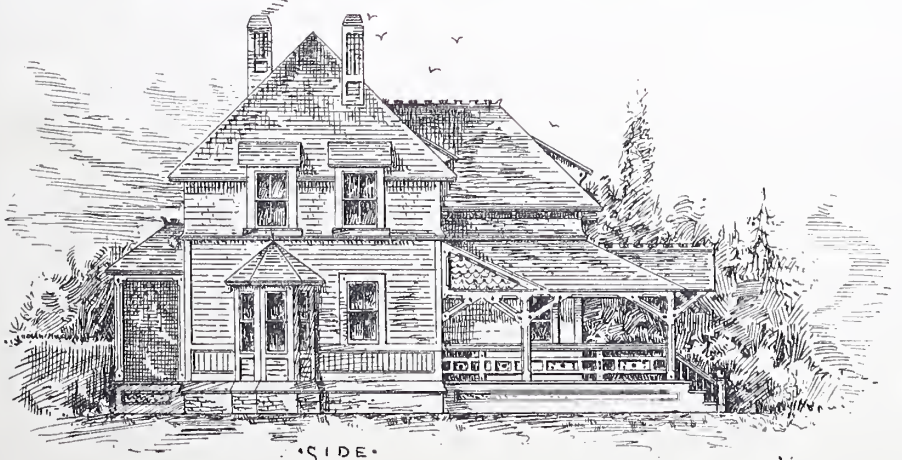
A COUNTRY HOUSE

ELEVATIONS

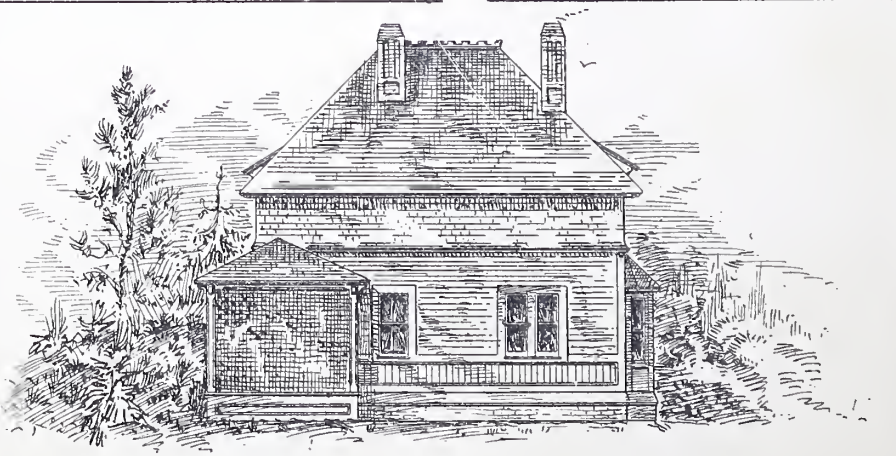
Edward Dawson
architect
28 State St.
Boston

FRONT

SIDE



SIDE



REAR

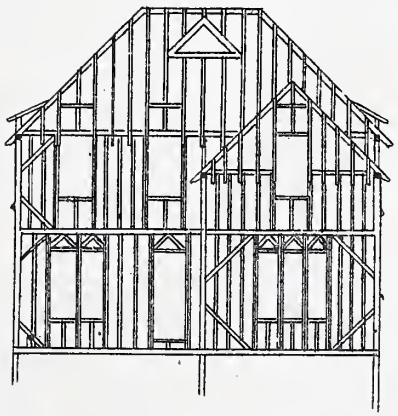
SCALE. 10 8 6 4 2 ft.

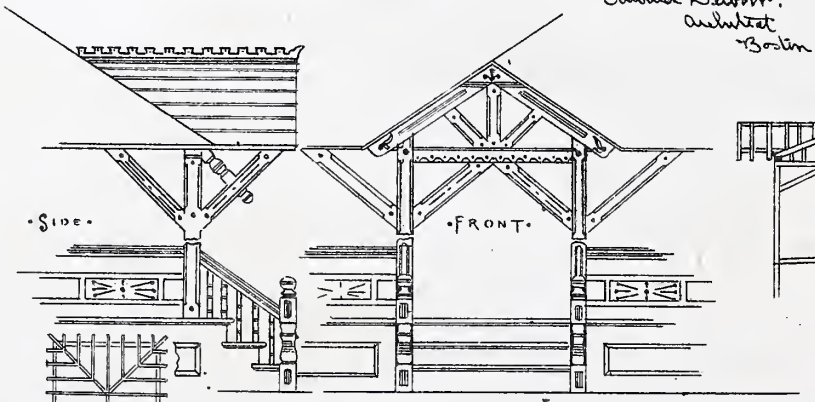
PLATE No. 83

A COUNTRY HOUSE

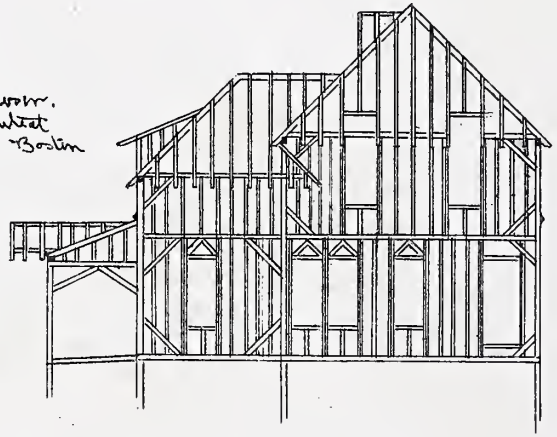
FRAMING PLANS AND DETAILS

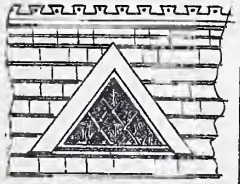
Edward Dewson.
Architect
Boston





FRONT PIAZZA





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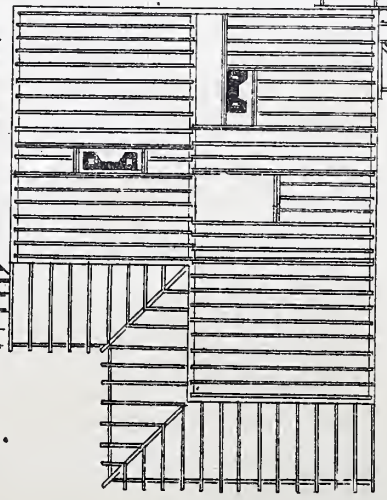
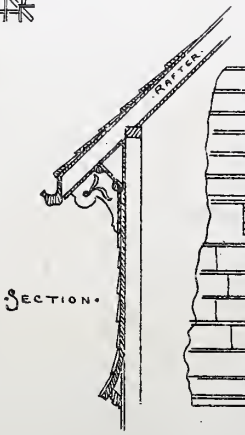


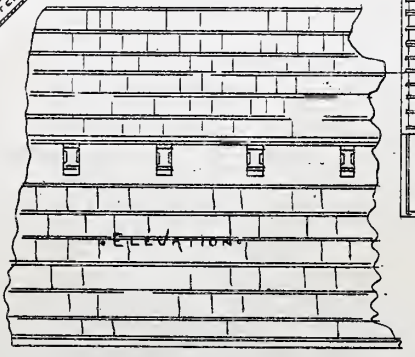
SIDE

SMALL GABEL ON MAIN ROOF

2ND FLOOR

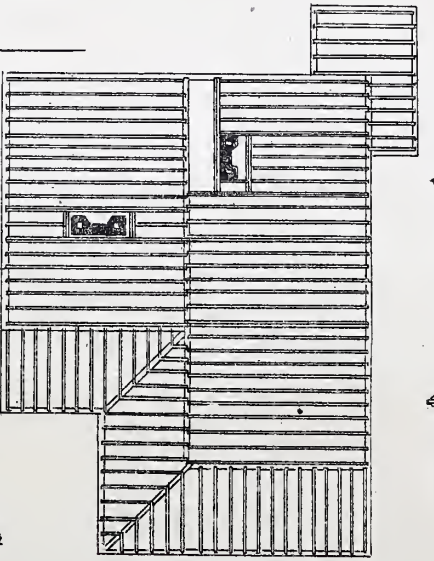


SECTION



ELEVATION

DETAILS OF ROOF



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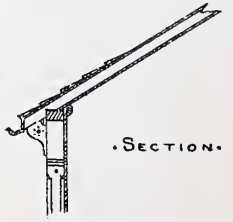
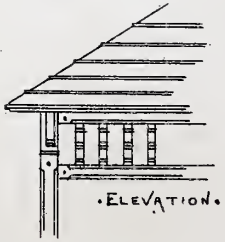


SECTION



ELEVATION

REAR PIAZZA

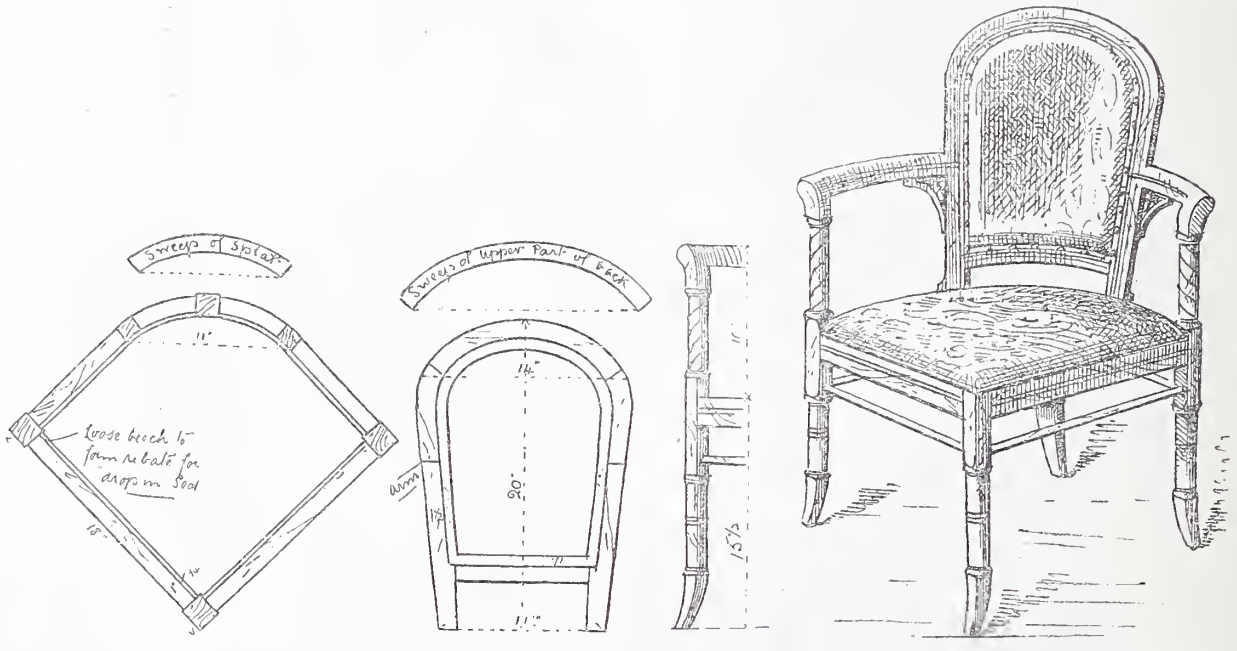
SCALE FOR DETAILS

SCALE FOR ELEVATIONS

How to Make a Corner Chair.

THE season of the year is now at hand in which the carpenter and joiner will have more or less time at his disposal, and in which he will have a strong desire to "make something" for himself or his friends. Now, what is nicer for a gift to a mother, wife, sister, daughter or other dear friend, than a comfortable arm chair? And how much more would the gift be appreciated, when known to be the work of the givers hands? To enable our readers, workmen, professional or amateur, to make a chair—a corner chair—one that will be comfortable and substantial, we submit the following instructions and illustrations:

The selection of the wood for the chair is a matter of taste; black walnut, mahogany (stained dark), rosewood, or dull black are all suitable. To save expense, it might, moreover, be made without the underframing or listing shown, although the strength would be reduced without it. But our purpose for the moment is, "how to make," and a few practical hints may be useful on that point. The first business is to produce the molds to working drawing shown, and as an inch scale is adopted, this should be a simple matter. Then get out the four legs—*i. e.*, two long and two short. The two long legs must be out of 2in. wood, to allow of throw over scroll at top; 1½in. wood will do nicely for the short ones. The seat rails must be of 2in. solid wood, and beach cannot be used except for blocking, as all the wood is more or less seen. The back might be 1½in. wood, to allow, when top is glued on, for shaping back and front to bring it in a line with the top. The top would take a piece of 4½in. wood, to allow for sweep. Of course where several chairs are made, the tops can be marked one into the other, and thus waste of timber avoided; 1¼in. wood will be stout enough for the arms and brackets. The splat must be out of 1½in., which will allow for stuffing rebate.



Having got the wood ready to these thicknesses, mark off legs for turning, mortice same, and see that the turner proceeds with them, otherwise delay may occur later on. Only the three corner legs can be morticed, as dowels must be employed for the leg at back. After secing that mortices and tenons are right and fitted, care as to glueing up will be necessary. First glue two shaped back rails to leg at back, then put angle part together—*i. e.*, the two front square rails; the two complete parts can then be glued together at the long leg corners. It must not be forgotten that before glucing it is necessary to put in listing and rebate rails for loose seat. The back can now be made. Get two uprights far back, place on seats to get right, and use top with uprights before glueing, to get complete back in correct line, placing them on to seat with loose dowels. Now fit splat and top, and having got them nicely fitted, glue splat in first, taking care to knock on top before glue of splat is dry. After being thus glued up the back can be shaped, rebated, and moulded, and then placed on to seat again, still with loose dowels. Nothing now prevents the fitting of the arms, springing them in with loose dowels, and then fit brackets under arms. The operation of glueing back on to seat may now be done, but it will be well to put arms and brackets on at same time, in case the back would not give sufficiently for the dowels in the arms. The making of a loose seat ("Trafalgar" chair fashion) is a simple matter; the loose seat should stand up a quarter-of-an-inch above the level for the convenience of the upholsterer, leaving about an eighth-of-an-inch all around the rebate. The wood for the seat must be out of 2in. solid wood. These directions followed, the chair should be ready for polishing and stuffing.

The upholstering may be done at home by any person who has a taste in that direction, and who has some knowledge of the art.

A chair made from these directions, and upholstered neatly, will be as lasting as comfortable.

Decorative Art.

IT is important to understand, says a correspondent, for instance, why the cover of a book is more artistic when the ornament is of a conventional or non-naturalistic kind than when it is stamped or impressed with unmeaning wreaths of flowers or leaves; or why our wall-papers and carpets are more in keeping with the dictates of correct taste when their surfaces are relieved by flat patterns, dictated by the fabric and by colors which harmonize with the surroundings of the apartment. The geometrical distribution of foliage, especially of that kind which the Japanese artist has taught us in the varied disposition of his diapers and medallion ornamentation, and the harmonious blending of colors such as he has shown in his charming faience and lacquer work, appear to offer the nearest approach to decoration in which both the principles mentioned have been exemplified. Few of the admirers of naturalism in art can object to a treatment which gives ample play for the imitation of natural forms, and we do not think the conventionalist will be disposed to undervalue the exquisite sense of creative fancy displayed in some of these productions. The Oriental textiles furnish the most beautiful examples of the law of adaptation of natural object to works of art, and we find one of our leading art-manufacturers up town following this *motif* of design in the production of wall-hangings, carpets, and chintzes.

in which flowers, fruit, and foliage of American growth are treated with a naturalness and individuality of type, yet preserving an artificial arrangement of a purely conventional and geometrical character. The chrysanthemum and tulip, the apple and mistletoe, are types we have seen treated in this manner. Since all service ornament has to be repeated, as in the case of a wall-paper, the proper degree of naturalness compatible with this kind of distribution is a matter of the first consideration. It may be taken as a principle of general application that the greater the repetition the less natural ought to be the treatment. A natural type always loses by repetition. Many other reasons may be given for assuming that a conventional or ideal treatment of ornament is one which most strictly follows the method of nature; and the real issue between the disputants of the two schools of decorative art appears to be that while one copies nature as he sees it, the other studies her methods and true spirit.

The true characteristics of decorative art can only be understood by distinguishing clearly the limits of these principles—in fact, by defining those modes of arrangement which separate decorative from "expressive" art. Decorative art has been well defined by Veron in his admirable work on æsthetics as being "achieved mainly by arrangement of line, form, color, sound, rhythm, movement, light, and shade, without any necessity for the intervention of idea or sentiment. The arts of design are, therefore, not the only ones which may have a decorative character. It is to be found in the dance, in music, poetry, and in rhetoric.

Our ballet measures are nothing but decorative dancing, with the one object to please the eye." The same author, however, seems to place decorative art in a lower category than has been assigned to it, and it is probably the endeavor of late to revive what is called "high art" that has made decorative artists impatient to the limits and necessary trammels imposed on decorative design. They like to introduce images, ideas, and sentiments into their work, and to this extent they fail to give us purely decorative character. Greek art was purely decorative in its feelings; we mean that which has ever remained subordinate to architecture. It was perfection and grace of outline and form which were the aims of the Greek artist; even Greek sculpture was decorative, and the same spirit was rekindled by the artists of the Renaissance.

We might instance the decorative art of the Renaissance as having been found on principles derived from Greek art; but our main object is now to show that architectural decoration, including sculpture, has been long suffering from a confused view of the principles upon which the best examples have been designed, and that our ideas of decorative beauty in design have been solely derived from the antique, without a corresponding ability to use the methods the artist of the antique followed. Without this knowledge, all our copies and academic studies, and all the teachings given in our art schools will be of little avail. We must train our art students, especially those who will direct our manufactures, to become decorative artists, not imitationists or dabblers in "high art;" and to do this we must show them how to convert natural types into ornament which shall subserve the objects which it is intended to decorate. But a knowledge of natural types is useless if it leads to no other result than copying or reproducing them; it must be accompanied by an ability to idealize—the power of abstraction or of seeing things in a sense removed from the visible and concrete manifestations in which they are presented to the eye. The greatest artists have been those who have been gifted with the power of "conventionalizing," as we term it; in other words, of abstracting the elements of natural types, and applying them in a decorative manner.

Tin Roofs.

A TIN roof properly put on and kept properly painted will last about 30 years. A tin roof ought not to be painted for the first time until it has been on about 30 days, so as to get the grease off the tin, and all the rosin should be carefully scraped off.

It is sometimes necessary, on buildings where there is much dampness or steam, as stables, blacksmith shops, round houses, etc., to paint the tin one coat on the under side before laying. After the roof has been painted the first coat, it should be painted again in about a year, and after that, once in three years is enough.

There are two kinds of tin; one, the coating of which is all tin—that is, the tin proper, sometimes called "bright tin"; the other, the coating of which is a composition, part tin and part lead; this is called "tern," "leaded," or "roofing" tin. This last is a little cheaper than the "bright," and will not rust any quicker, but we think, as do many others, that the sulphur in our soft-coal smoke eats through the "leaded" coating sooner than through the "tinned."

Of tin there are two sizes, 10″x14″ and 14x20 and two grades as to thickness, IC the light, and IX the heavy.

For a steep roof, one-sixth pitch or over, the IC, 14x20 tin ("leaded," if high up, where little smoke will get to it; "bright," if low down, where much smoke will get to it), put on with a standing groove, and with the cross reams put together with a double lock, makes as good a roof as can be made.

For flat roofs, the best roof is made with the IX, 10x14, "bright" tin, laid with cleats; but the others make good roofs, and any of them will last 25 years at least.

All tin roofs should be laid with cleats, and not by driving the nails through the tin itself.—*Carpenters' and Builders' Journal.*

About Lime Kilns.

LIME is derived from its carbonate, which exists in immense quantities in nature in the form of limestone, including marble. It is, where these are abundant, prepared from oyster shells, which are also a carbonate of lime.

The process consists in calcining the carbonate in kilns, during which the carbonic acid is driven off, leaving oxide of calcium, or quicklime.

The forms of kilns are various, probably the most primitive being made by excavating a hole in the earth in the shape of an inverted cone, in which alternate layers of limestone and fuel were placed, and the top covered with sods. Kilns having chambers in the form of an inverted cone are generally employed in places where materials are scarce and coal is the fuel used. The ovoidal form, truncated at its upper part, is, however, generally preferred, on account of its losing less heat by radiation, and allowing the upper portion of the lime to settle more gradually and evenly as the lower portion is withdrawn.

The kiln may be built of either stone or brick, either cylindrical or rectangular, and usually against the side of a natural bank, or a mound is thrown up behind it. It should be lined with a double thickness of fire-bricks, the space between which and the outer masonry is filled in with well-rammed cinders to prevent loss of heat.

A continuous kiln, employed in Belguim, has eight openings for removing the lime, which is being continually withdrawn, while fresh charges are added at the top. It is charged with alternate layers of coal and limestone, in the proportion of one coal to four limestone, and is allowed to cool but once a year, for inspection and repairs.

A kiln was invented by Count Rumford, having for its principal objects to consume the smoke, to bring a large surface of flame and hot vapor in contact with the limestone, to keep the latter separate from the fuel, and to allow the process to be continuous. It consists of a truncated cone, some 15 feet high, 2 feet in diameter at base and 9 inches at top. In order to retain the heat, the sides, which are of brick and very thin, are double and filled in with dry wood ashes. The fuel is introduced through an opening above, which is covered by a hinged iron door, raised and lowered by means of a chain, to regulate the draft. The opening for cleaning the fire-place is provided with a grate and ash pit, and also, by causing a horizontal draft into the furnace, assists in consuming the smoke. The limestone is fed in at the top of the furnace. The products of combustion are directed downward before they are admitted into the body of the kiln, the unconsumed portion finally passing out at the top. The incandescent mass of lime below assists in heating the charge above. The lime is removed at an opening below, and fresh charges are added at the top as this is gradually withdrawn.

A kiln invented by Mr. Booker, of Dublin, having the form of two truncated cones joined at their bases, where the diameter is about 7 feet, tapering to 3 feet at top and bottom, and from 25 to 30 feet in height, is said to have produced excellent results. A pivoted plate of iron is placed over the top for regulating the draft.

Artificial hydraulic lime is now manufactured on a large scale in England and France, and has been employed in a number of important works.

Two qualities are prepared by two different processes. The first, which produces the best lime, but is most expensive, consists in mixing with rich slacked lime a certain proportion of clay, and calcining the mass. In the second, some soft calcareous material is substituted for the lime, and the materials incorporated by grinding.

In an establishment at Mendon, near Paris, the materials used are the chalk of the vicinity and a clay from Vaugirard, in the proportion of four chalk to one clay. These, broken into lumps, are thrown into a circular basin, around which an upright millstone, having its axis attached to a vertical shaft, is caused to travel; this is provided with a follower, consisting of a wheel having attached tooth arrangements; by this the mixture is, with the addition of water, ground into a pulp, and is drawn off, descending successively into a series of chambers at different levels, until it attains the proper consistency for molding. The mass is then divided into regular and equal prisms by means of a mold, and these are placed on drying shelves until sufficiently dry for burning.

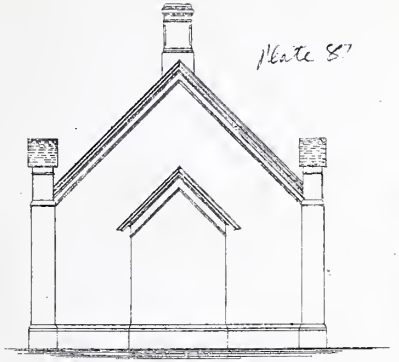
Cato (150 B. C.) gave directions for forming a lime kiln. He preferred a truncated cone, 10 feet diameter at the bottom, 20 feet high, and 3 feet diameter at the top. The grate covered the whole bottom; then there was a pit below for the ashes and two furnace doors, one for drawing out the burnt stone and the other for admitting air and fuel.—*Brick, Tile and Metal Review.*

Tiles.

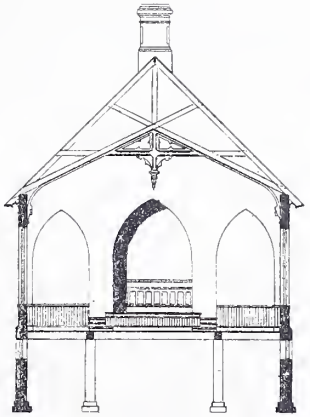
TILES are thin slabs of baked clay, of whose manufacture we gave a description in these columns some time ago. They are extensively used in Europe for various purposes—roofs, gutters, pavements, drains, house siding, lining flues, furnaces, etc. They assume many forms; some have a local character, others are made in imitation of the antique.

Plain tiles are usually made $\frac{5}{8}$ of an inch in thickness, $10\frac{1}{2}$ inches long and $6\frac{1}{4}$ inches wide. They weigh from 2 to $2\frac{1}{4}$ pounds each, and expose about one-half to the weather. 749 tiles cover 100 superficial feet. They are hung upon the lath by two oak pins, inserted into holes made by the molder. Plain tiles are now made with grooves and fillets on the edges, so that they are laid without overlapping very far, the grooves leading the water. This is economical of tiles, and saves half of the weight, but is subject to leak in drifting rains, and to injury by hard frosts.

Pan-tiles, first used in Flanders, have a wavy surface, lapping under and being overlapped by the adjacent tiles of the same rank. They are made $14\frac{1}{2}$x$10\frac{1}{2}$; expose 10 inches to the weather; weigh from 5 to $5\frac{1}{2}$ pounds each; 170 cover 100 square feet of surface.



Rear Elevation.

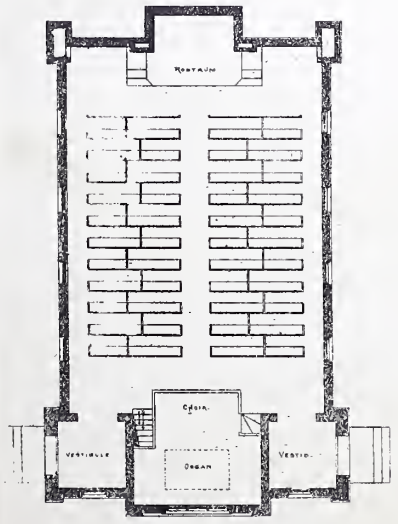


Cross Section.

DESIGN.
for
A Village Church.
F. J. G.

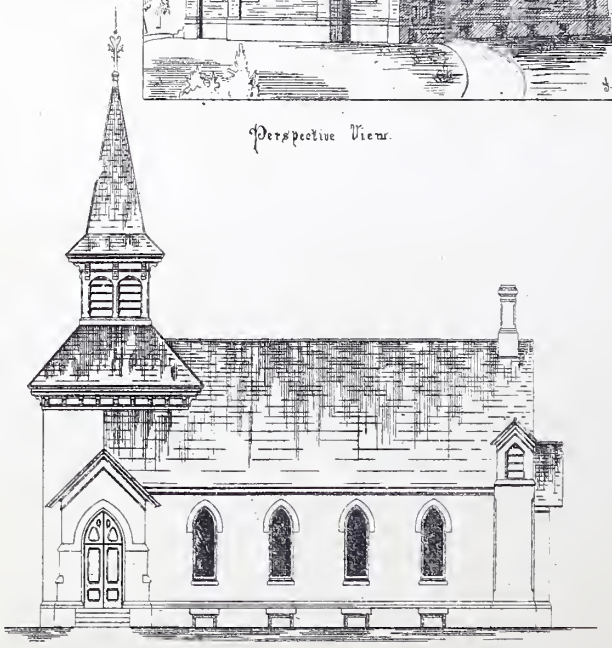
Scale.

Perspective View.



Plan.

Front Elevation.

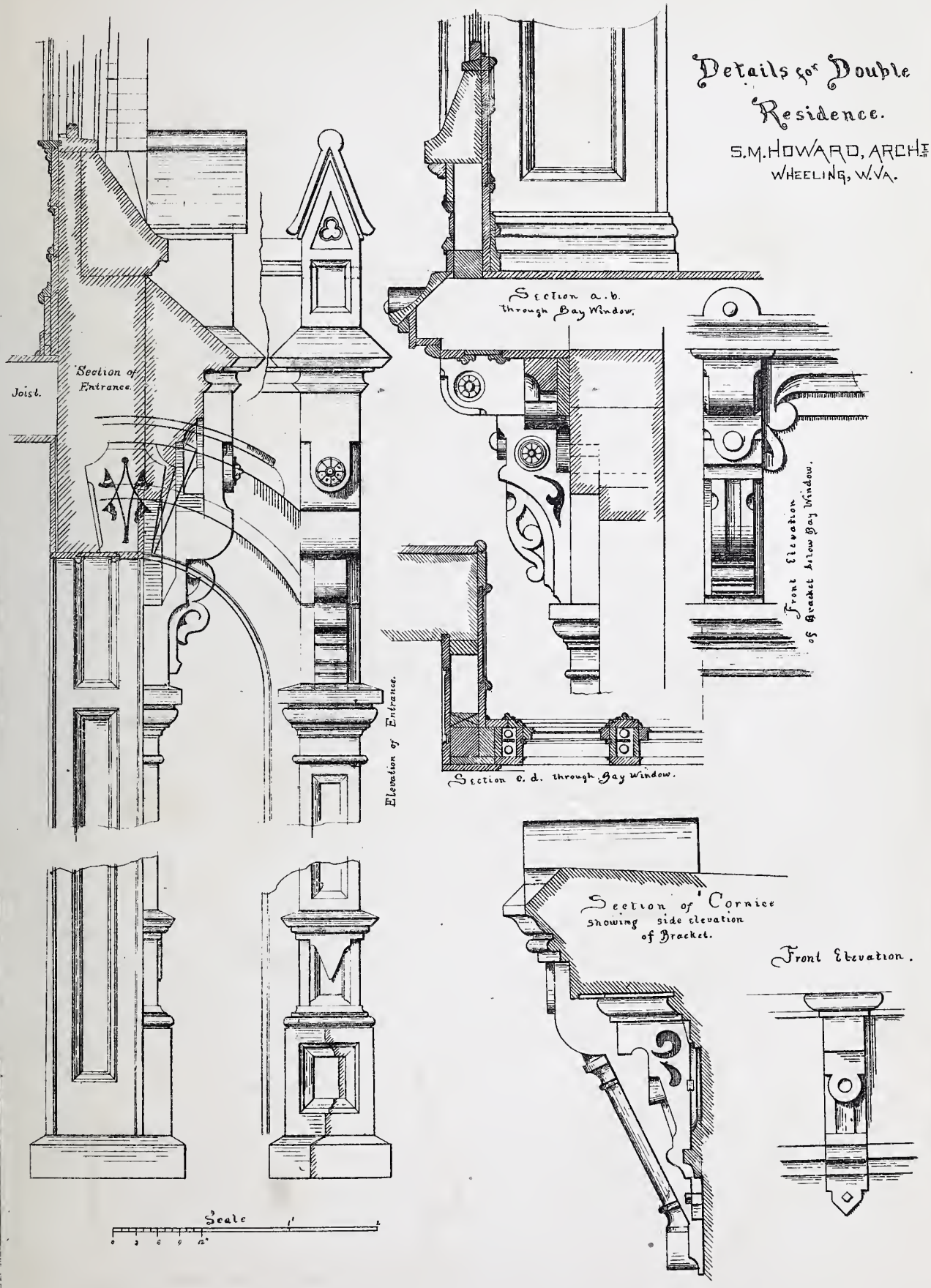


Side Elevation.

PLATE No. 85

Details for Double Residence.

S. M. HOWARD, ARCHT
WHEELING, W. VA.



Crown, ridge, hip and valley tiles are semi-cylindrical, or segments of cylinders, used for the purposes indicated. A gutter tile has been introduced in England, forming the lower course, being nailed to the lower sheathing board or lath.

Siding tiles are used as a substitute for weather-boarding. Holes are made in them when molding, and they are secured to the lath by flat-headed nails. The gage, or exposed face, is sometimes indented to represent courses of brick. Fine mortar is introduced between them when they rest upon each other. Siding tiles are sometimes called weather tiles and mathematical tiles; these names are derived from their exposure or markings. They are variously formed, having curved or crenated edges, and various ornaments either raised or encaustic.

The glazed tiles are inferior to slate, as they imbibe about one-seventh of their weight of water, and tend to rot the lath on which they are laid. Good roofing slate only imbibes one two-hundreth part of its weight, and is nearly waterproof.

Encaustic tiles are ornamented tiles having several colors. A mold is prepared which has a raised device on its face, so as to leave an impression on the face of the tile cast therein. This intaglio recess is then filled by a trowel with clay compounds, in the liquid or slip stage, and which retain or acquire the required colors in baking. The tile is then scraped, smoothed, baked and glazed. This tile is common in ancient and modern structures. The glazing came from the Arabs, who derived it from India, and primarily from China.

Drain tiles are either molded flat and bent around a former to the proper shape, or are made at once of a curved form by pressing the clay through a dod or mold of the required form. The latter plan is now generally used.

Various machines are used in the manufacture of tiles. One of these has two iron cylinders, around which webs of cloth revolve, whereby the clay is pressed into a slab of proper thickness without adhering to the cylinders. It is then carried between two vertical rollers, which impart a semi-cylindrical or other required shape, after which the tiles are polished and finished by passing through three iron molds of horseshoe form, being at the same time moistened by the dripping of water from a tank above, and finally conducted off upon an endless web.

In more recent machines the tiles are generally formed at one operation, by pressing. A charge of clay sufficient to form a number of tiles is placed in a cylinder and subjected to the action of a piston, which forces it out as a continuous tube, after which it is cut in lengths by a wire. The most modern machines generally employ a screw, which serves at the same time to mix the clay and force it through the mold; the process of feeding and molding is thus rendered continuous, no time being lost in charging the cylinder.

One of the most improved of modern machines consists of a vertical pug mill, containing rotary curved knives and a screw follower for forcing the clay through the dies. The pipe, on issuing from the dies, is carried forward by a series of rollers having hollowed surfaces, and is cut into lengths by a rocking frame provided with cross wires. In another machine the clay is forced through the ties by two plungers working in boxes at the base of the pug mill, and reciprocated by cranks set at right angles to each other on the same shaft; two sets of dies are employed; one plunger being retracted to allow its box to receive a supply of clay, while the other is engaged in forcing the clay through its die.

Tiles are usually placed in the kilns in bunches of twelve, and laid alternately cross and lengthwise. The spacing of the tiles allows the circulation of the heat between them, and the circular form of oven is found well adapted to secure uniformity of heat. The kiln is protected on the windward side to prevent uneven urging of the fires. The oven being set, the doorway is bricked up and daubed, the fires kindled and kept burning moderately at first, and then more freely. The usual time for firing is thirty-eight hours. Three days are then allowed for cooling, and they are afterwards taken out of the kiln. Those tiles that are to be made of a grayish color are thus treated: It having been ascertained that the tiles are burnt enough, and while still red hot, a quantity of small fagots of green alder with the leaves on is introduced into inch flue. The flue holes are then well secured, and the holes in the roof each stopped with a paving tile, and the whole surface is covered with four of five inches of sand, on which a quantity of water is thrown to prevent the smoke from escaping anywhere. It is this smoke which gives the gray color to the tiles, both internally and externally. The kiln is then left closed for a week, when the sand is taken off the top, the door and roof holes are opened, as also the flue holes, and the charcoal produced by the fagots taken out. Forty-eight hours after, the kiln is cool enough to allow the tiles being taken out and the kiln charged again. Whenever any of the tiles are to be glazed, they are varnished after they are baked; the glaze being put on, the tiles are put in a potter's oven till the composition begins to run. The glaze is generally made from what are called lead ashes, bing melted and stirred with a ladle till it is reduced to ashes or dross, which is then sifted, and the refuse ground on a stone and resifted. This is mixed with pounded calcined flints. A glaze of manganese is also sometimes employed, which gives a smoke-brown color. Iron filings produce black; copper slag, green; smalts, blue. The tile being wetted, the composition is laid on with a sieve, and the tile subjected to the heat necessary to vitrify the application.—*Brick, Tile & Metal Review.*

Kalsomining and Distemper.

DISTEMPER COLORS FOR WALLS.

IF distemper is to be applied to a wall or ceiling which is covered with plaster, some whiting is put into water, where it must be easily broken and diluted if allowed time to soak; it must be completely saturated, and when it has settled the clear water must be poured off. To correct the too great whiteness, and to prevent a yellow cast, grind separately in some water a little in digo or ivory black, and mix with it; then add to the mixture some strong size which has been previously warmed, well stirring the whole till properly mixed. The whole of the distemper must be strained while warm, in order to remove all impurities and thoroughly mix the color. When this is done, the distemper may be put into a cool place till it is formed into a weak trembling jelly, which is the only proper state in which to apply it to the walls. All size distemper colors which are applied to walls, and which are mixed with whiting, should at all times be worked cold, and of a weak trembling jelly, otherwise it will be impossible to make good work, and great care should be taken not to have too much body in the color, for it will certainly crack and fall off in scales, as it is not the strength of the size that causes the work to crack, but the body of color. There is a great advantage in having a sufficient quantity of size in the first coat of distemper, as it binds hard, and stops the suction of the wall, in consequence of which the next coat, if properly prepared, will not move the first coat, but it will work perfectly free, and when dry the work will have a uniform and solid appearance. This method of whitewashing and coloring walls is far superior to lime, as it works much smoother, and when properly mixed and worked upon a new wall it will not crack and fall off in scales; it also covers better, and after being repeatedly applied for a number of years the walls need no scraping, as the color easily washes off with a whitewash brush, after they have been well soaked with water.

Woods Stains.

HERR LEO, pharmacist of Benshein, Germany, recommends the following stains for oak, pine, beech, poplar, etc.:

1. Yellow Stain.—Wash over with a hot, concentrated solution of picric acid, and when dry, polish the wood.

2. Ebony Black.—Wash with a concentrated aqueous solution of extract of logwood several times; then with a solution of acetate of iron of 14 degrees, Raume, which is repeated until a deep black is produced.

3. Gray.—One part of nitrate of silver dissolved in 50 parts of distilled water; wash over twice, then with hydrochloric acid, and afterwards with water of ammonia. The wood is allowed to dry in the dark, and then finished in oil and polished.

4. Light Walnut.—Dissolve one part of permanganate of potassium in 30 parts of pure water, and apply twice in succession, and after an interval of five minutes wash with clean water, and when dry, oil and polish.

5. Dark Walnut.—Same as for light walnut, but after the washing with water, the darker veins are made more prominent with a solution of acetate of iron.

6. Dark Mahogany.—Introduce into a bottle 15 grains alkanet root, 30 grains aloes, 30 grains powdered dragon's blood, 500 grains 95 per cent. alcohol, closing the mouth of the bottle with a piece of bladder, keeping it in a warm place for three or four days, with occasional shaking; then filtering the liquid. The wood is first mordanted with nitric acid, and when dry washed with the stain once or oftener, according to the desired shade; then the wood is dried, oiled and polished.

7. Light Mahogany.—Same as dark mahogany, but the stain being only applied once. The veins of true mahogany may be imitated by the use of acetate of iron skillfully applied.

Dangers of Wooden Structures.

THE unsanitary condition of certain towns in this country has drawn attention to the fact that wooden houses, and especially wooden foundations, are liable after a certain time to cause malarious symptoms. So many malarious attacks have been experienced of late years in San Francisco, that the medical men began to suspect the buildings, especially as the structures themselves, which are nearly all built on wooden foundations, began to show disturbances, cracks appearing in the walls and the floors settling. Scientific investigation into the causes of these troubles points to the fact that the wood used in the foundations become decayed by

eontact with the sand, which destroys its fiber and leaves it porous and brittle. The next stage in the process is the formation of a fungus growth from the edge of the wood, eomposed of infinitesimal insect life, whieh burrows the remaining wood until its vitality is gone, and the insect itself dies. Physicians attribute many of the unpleasant smells and the bad health that hang about the inhabitants of these dwellings to this malarial condition, which to a great extent disappears as soon as proper foundations are substituted for those of wood.

Priming for Oil Paint.

O. KALL, of Heidelberg, prepares a substitute for boiled oil by mixing ten parts of whipped blood just as it is furnished from the slaughter-houses with one part of air-slaked lime sifted into it through a fine sieve. The two are well mixed and left standing for twenty-four hours. The dirty portion that eollects on top is taken off, and the solid portion is broken loose from the lime at the bottom, the latter is stirred up with water, left to settle, and the water poured off after the lime has settled. The clear liquid is well mixed up with the solid substance before mentioned. This mass is left standing for ten or twelve days, after which a solution of permanganate of potash is added which decolorizes it and prevents putrefaction. Finally the mixture is stirred up, diluted, if nccessary, with more water to give it the consistcnce of very thin size, then filtered, a few drops of oil of lavender added, and the preparation preserved in closed vessels. It is said to keep a long time without change. A single coat of this liquid will suffice to prepare wood or paper, as well as lime or hard plaster walls, for painting with oil colors. This substance is eheaper than linseed oil, and closes the pores of the surfaee so perfeetly that it takes much less paint to cover it than when primed with oil.—*D. I. Zeit.*

Terra-Cotta Lumber.

AN EXTRAORDINAEY INVENTION—THE GREAT BUILDING MATERIAL OF THE FUTURE.

THERE are now on exhibition at the American Institute several specimens of what is known as Terra-Cotta Lumber, a material composed of elay and of sawdust, these substances being manipulated by steam machinery and worked through different proeesses to a finished product, giving a material as cheap and not unlike brick. Owing to its extreme toughness and porosity, however, it can be bored and nailed and treated with edged tools like wood. It is one-half to six inehes thick and generally twelve inchcs wide. The sawdust is first screened in the same manner as sand, so as to take all the large ehips or culls out of it. The clay is of the finest quality, being culled "top clay" or "Kaolin," which is put into the grinding mills, afterward all being thoroughly mixed. Then it is taken up by elevator buckets to the moulding mill and moulded into different sizes. It is allowed to stand in the drying-room until all the moisture evaporates, and then transferred to the kilns where it is burned.

The company which has become the owner of the patent by purchase claims that this new material is indestructible either by fire or water. Add to this the faet that it is remarkably cheap, and there appears to be no reason why this latest product of the inventor's mind known as Terra-Cotta Lumber should not beeome the most popular building material in use.

The New York Terra-Cotta Lumber Company, of which Mr. C. C. Gliman is president, have erected a large factory at Crow's Mills, near Perth Amboy, N. J., where the process of manufacturing this lumber ean be witnessed by those interested. These works cover over twelve acres, and their manufacturing eapacity exceeds fifty tons daily. On a recent visit to the factory, the foreman in order to display the resistant qualities of the Terra-Cotta Lumber to fire and water, withdrew from the eentre of a burning kiln a red hot "trial-piece," about four inches square, and plunged it into a pail of water. After cooling, it was placed upon the blacksmith forge and the water with which it was saturated expelled in shape of steam; then pouring petroleum over it, the foreman ignited it with a lighted match and presented the writer with an elegant toreh, remarking that it would burn long enough to boil a tea kettle. Subsequent examinations of the block, by sawing it in twain, discovered no differenee in appearanee from the other material which had not been submitted to so fiery an ordeal.

The very fact that a composition as thoroughly proof against fire as asbestos, as workable with edged tools as wood and as cheap of manufacture as bricks, can be made of materials hitherto considered worthless and existing in immense quantities within twenty-five miles of New York is really, looked at either from a scientific or business standpoint, a miracle. In the erection of fireproof buildings, Terra-cotta Lumber must of necessity occupy the very first rank. In a prospectus issued by the company illustrations are given showing the manner of laying floor arches of Terra-Cotta Lumber, and also for the erection of fireproof partitions. Plastering adheres to the material with great tenacity, no lathing being required. In the eonstruction of Mansard roofs its use eannot be overestimated.

For sheathing around boilers, no known substance equals Terra-Cotta Lumber. It is cheap, can be easily sawn to any desired thickness, shape or size; removal for repairs is a simple proeess, and it is the best non-eonductor of heat in the market. The method of application can be varied to suit any shape as easily as wood. The question of success in the transmission of steam through pipes (as in the heating of eities by steam now being largely put in operation, or in supplying power at a distanee from the boilers,) depends entirely upon efficient protection against the loss of heat by radiation. In fact the use to whieh this material can be put is virtually without limit. Mr. George B. Post has used it in many ways. Mr. C. C. Haight, Trinity building, is using it as roofing and eeilings in Columbia College. Messrs. Hubert, Pierson & Co. are putting it in the Navarro apartment houses, and the Wight Fire-Proofing Company is using it largely, in this city and others, for its speeialties. In a future artiele we will give further information in regard to this wonderful material.—*Real Estate Record.*

A Specimen Chicago Residence.

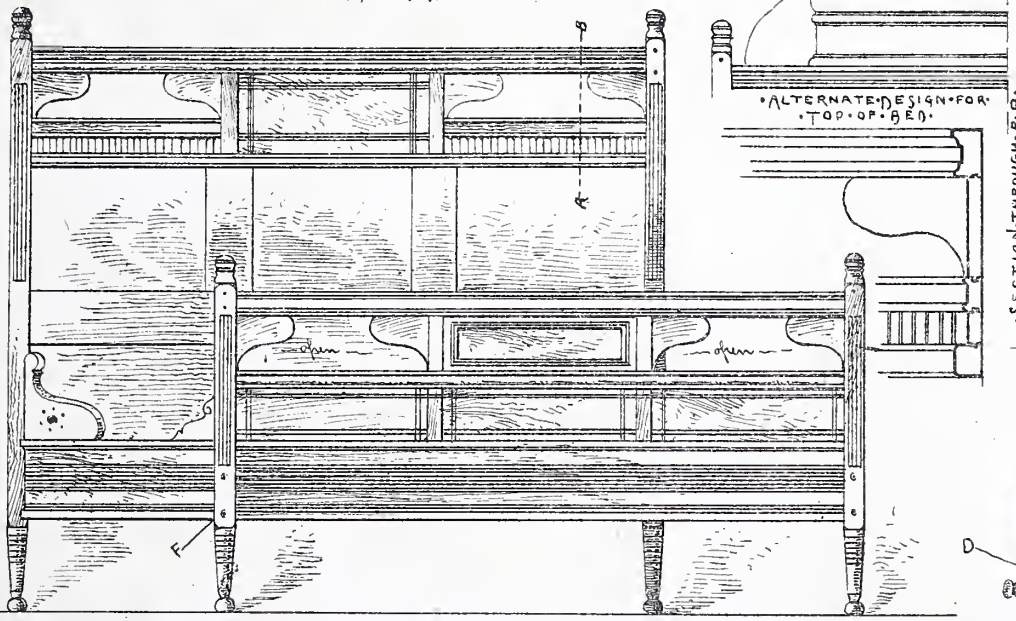
A MASSACHUSETTS artist reeently eompleted the interior decorations of a house for a gentleman in Chieago, upon which he has been engaged for some time past, the design and mueh of the work being his own. The wide hall has a eeiling of pale blue, sprinkled with gold stars. The frieze shows clusters of wild flowers, and over the doors, on creseent-shaped fields, are varied and beautiful floral designs. One of these shows apple blossoms and blue birds on the pale blue ground, another a garland of pansies Over one door are scarlet poppies and golden-hearted marguerites, and over another bright geraniums and grasses. Several large wall panels show golden rod and purple asters, lilacs and flowering almond, hollyhocks and pansies, as free and natural as to impart a sense of out-door sweetness and pleasure. The remaining wall spaee is covered with a geometrical design in two shades of gold. Perhaps the finest effeets are those in the library, the walls of which are dull mottled red, shading to lighter tones toward the ceiling. Upon this ground are long vine sprays with dark leaves, so painted that they seem to stand out from the shaded surfaee. The frieze is divided into rectangular spaces, in which are bright flowers—marigolds, helianthus and geraniums. Dividing this room from the wall is a border simulating a fringe, and above is a narrow band in soft neutral tints between the frieze and the ceiling. The latter is shaded olive, aeross which are thrown vine sprays with dark foliage. Over the three doors are panels bearing a wreath of bright blossoms. One has a cluster of many-hued pansies on a gold ground, and the others marguerites and purple clover heads, buttereups and feathery grasses. A large space above the mirrors is filled with the old-fashioned garden flowers of spring, great red and pink peonies, sweet syringas, snowballs and pale lilacs, the soft, loose petals and fresh eolors being entirely faithful to nature. A smoking-room, adjoining the library is brightened with autumn-tinted sprays against the dark green wall baekground, the pale gold of the frieze and the soft grey and green of the eeiling, on which is thrown a tangle of vines with an oecasional film of cobweb softening the whole effect. Against the sky background of the dining-room ceiling is a golden trellis work, over which are grape-vine clambers. Through the wider latticed space of the frieze hang bunches of full purple grapes, and the same design fills a large wall panel. Over the wide door is a great tangle of country blossoms on a field of blending blue and grey, and opposite the door is a wide panel bearing branches laden with red and golden apples, wonderfully true in modeling and color, and standing out very effeetively from a shaded ground. The perfection of delicate eolor and design is seen in the decoration of the parlor, where the walls and ceilings are of a soft grayish blue, with a stenciled frieze of blue and gold. The floral ornaments are roses and pansies in exquisite tints and eombination.

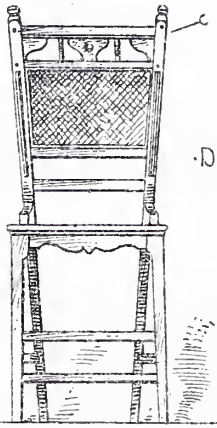
Items of Interest.

A NEW form of window is being introduced in London, England, for preventing accidents in cleaning, and securing good ventilation. The two side-bars of each of a pair of ordinary sash frames are divided into two parts vertically, and the part earrying the glass is swiveled or pivoted in the side pieces, at a point eentral to its height. The frame with the glass is held in position by two small bolts in the top rail, whieh shoot into the side strips. When this latter fastening is effected, the two sashes may slide up and down in the ordinary way. It will be seen that to elean this kind of window there is no neeessity for servants to go outside.

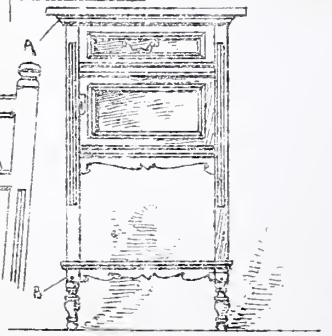
HAIR belts are quite extensively used in Germany. They are less smooth than leather or rubber, and therefore adhere better to the pulleys without slipping, so that a much narrower hair belt and pulley can be used than is the case with leather or rubber.

BUILDER AND WOOD WORKER.
"FREE WILL", SERIES.



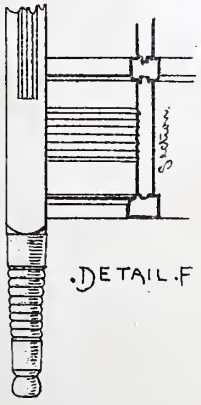


CHAIR.

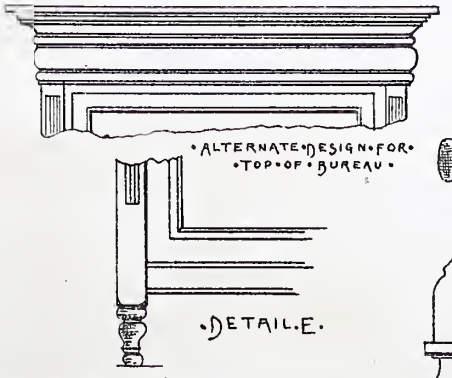


DETAIL C.

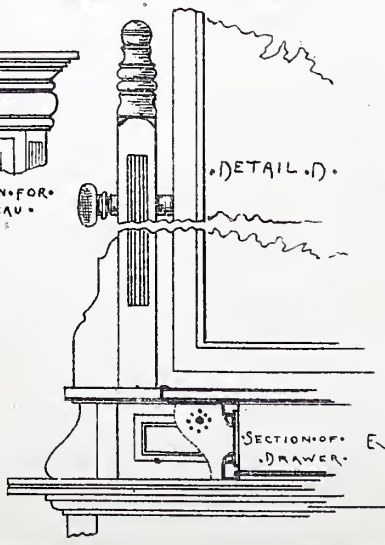
COMMODE.

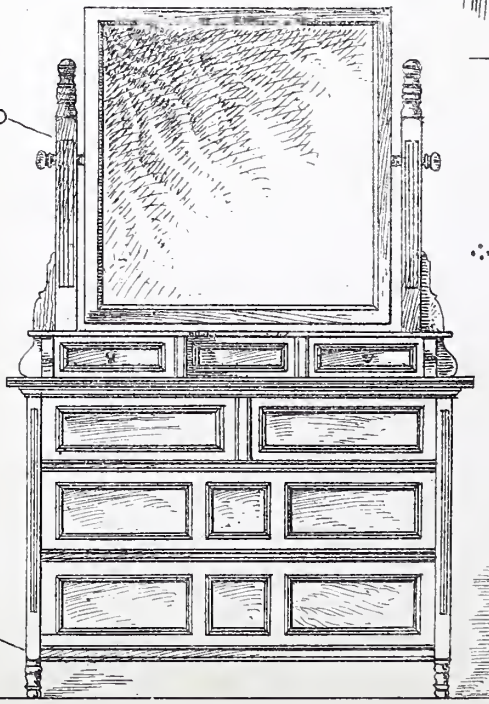


DETAIL F.

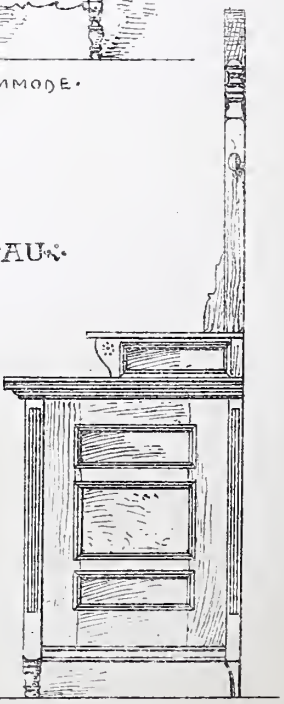


DETAIL E.





BUREAU.



FRONT.

SIDE.

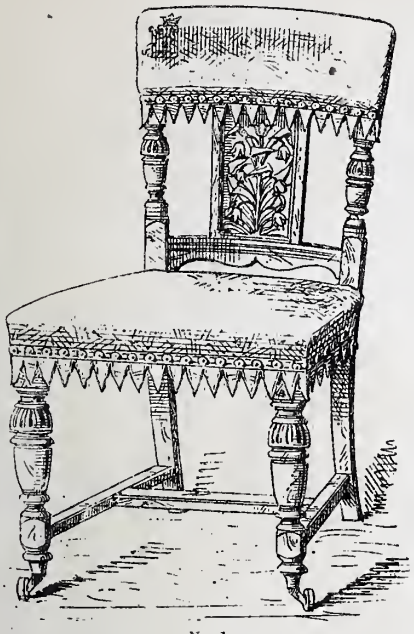
A SIMPLE CHAMBER SET.

SCALE FOR ELEVATIONS.

1 FT. 2 FT.

Edward Dawson
del. & invt. '82

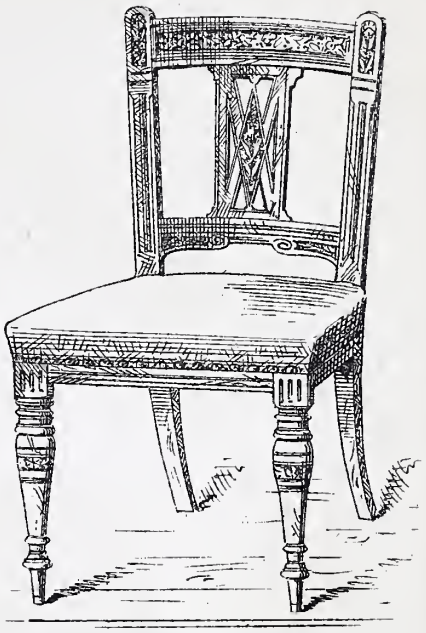
PLATE No. 87



No. 1.

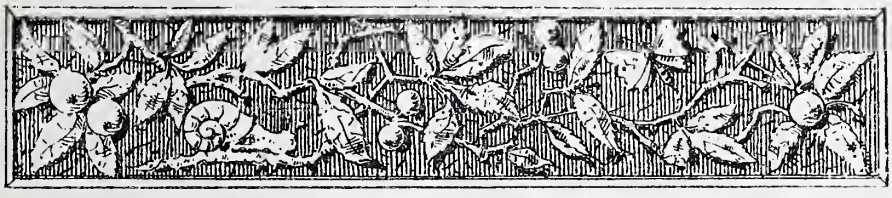
Dining Room Chair. By Messrs. Brew and Clark.

Carving on Chair No. 1.



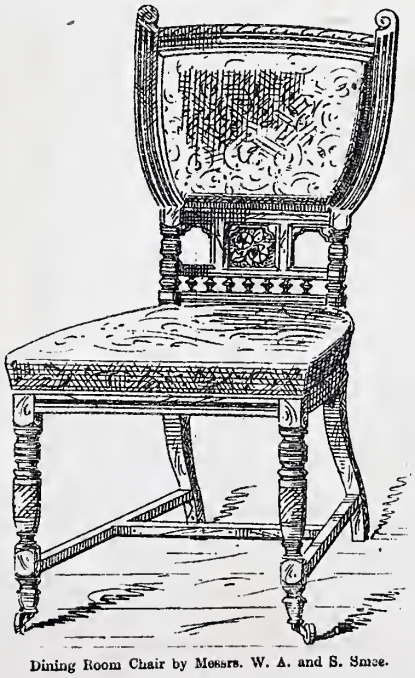
No. 2.

Dining Room Chair. By Mr. Geo. Sims.



Carving on Chair No. 2.

Drawing Room Chair by Messrs. Conrath and Sons.



Dining Room Chair by Messrs. W. A. and S. Smee.

Drawing Room Chair by Messrs. Paish and Ratcliff.

They are little affected by damp weather or by getting wet; at least they elongate much less than leather, and do not involve the stoppage of the machinery when long belts become so slack as to necessitate shortening. They are exceedingly strong and durable, only friction at the edges, which are the weak parts, must not be allowed, by avoiding the crossing of these belts. The high price at which they were sold at first has been lowered, so that now they cost about the same as leather belts.

THE improvement in architecture throughout the country is very noticeable. It is another mark of progress. Instead of the one-pattern houses of a few years ago, presenting unbroken front walls and stiff roof lines, we find in almost every village new homes that are attractive in design and pleasing in finish. There are fewer white houses, and the absence of glare is as restful as the architecture is suggestive of comfort.

The idea that if one has the materials, any sort of a builder can put them together, has been superseded, to a great extent, by the desire to have the design perfected as the first step toward the new house. The belief that the services of an architect is a useless expense has often caused the waste of more material than would have paid the best of them. The material worked into the inconvenient and unattractive dwelling, in skillful hands would have given the owner a pleasant place of abode. No surer sign can be found of the thrift of the people than the character of the buildings seen throughout the country.

A NEW process of wood decoration, known as diachromatized wood, has been recently patented in England by Henry Chalk Webb, of Worcester. The invention consists in producing patterns on wood and other materials by injecting colors, which has the effect of inlaying or painting, and for flooring, dados, and other decorative purposes, it appears to be highly applicable. One great merit of the invention, apart from its beauty and inexpensiveness, is the fact that the color being forced into the wood, under pressure is not likely to be obliterated by any amount of wear which it might be subjected to. Some specimens of flooring blocks of pitch pine, about one inch in thickness, were completely soaked through, although it is understood that for dado and wall purposes it is found sufficient to force the color in about 1-15 of an inch. It appears that the process is most successful using the darker colors, such as those which are employed for producing on a piece of common fir the effects of inlaying in walnut, dark oak, mahogany, etc., while the treatment of the lighter colored woods, such as sycamore, satinwood, etc., with such colors as pink and blue, does not produce such a real or artistic effect. This remark, however, does not apply to a remarkably handsome piece of wall dado, prettily made of American walnut, satinwood, and bird's-eye maple, "diachromatized" in mauve, black, and other colors in a florid, artistic pattern, and having all the appearance of a good specimen of inlaid work. For public halls, churches, libraries, and also private houses, this invention only requires to be known to acquire great favor with the public.

JENNIE JUNE has a good word for æsthetics. Those who cavil and sneer, she says, at the modern decorative school, should remember what the art idea has already done for us; they should go back to the bare, white walls, the frightful family portraits, the hideous vulgarity of the cabbage-rose carpets, and the masses of hard, crude color which paralyzed or excited the nerve forces, and created an atmosphere which every one was glad to get away from. Would the small towns and villages of New England have been denuded of their youth if they had cultivated beauty? No, indeed! It is in the homes of the New Englanders to-day, who have left New England, that we find the reactionary influence strongest—it is here that we find graceful form, picturesque draperies, harmonies of color; a softened light in place of a glare, and that completeness of material conditions which produces, or at least assists in producing, the serenity and satisfaction of the spirit. Beside, sneering and groaning are alike unavailing. The spirit is in the air, and instead of condemning it unheard better listen and find out what message it brings and how far we can apply it to our needs. Doubtless the school of romance and picturesque beauty is opposed to the leveling, practical, democratic spirit of the age; but do we not want something to oppose to this, to preserve to us our ideals, to restore our faith, to refine our manners, to save us from falling into the dead level of commonplace? There is no use of trying to drown a voice that comes from the East, and the West, and afar off—a voice that sounds so many echoes that it seems to be almost universal—and to that extent it is so is the voice of God himself.

THE following rules, to be observed in the construction of all buildings erected under her Majesty's Office of Works, have been prepared and issued by the Secretary to the Office of Works:

1. All water-closets and urinals shall be constructed so that one wall at least of such closets and urinals shall be an outer wall of the building.

2. All soil pipes shall be carried outside the building, and ventilated by means of pipes leading the foul gases above the highest point of the building. Such pipes to be carried to points removed from chimney stacks.

3. Separate cisterns shall be constructed for the water closets and for the general purposes of the building. No tap or "draw-off" shall be affixed to any pipe communicating with a cistern supplying a water closet or urinal.

4. All waste pipes and overflow pipes of cisterns shall terminate in the open air, and be cut off from all direct communication with drains.

5. Great attention shall be paid to insuring thorough ventilation in all rooms. Rooms so high that their ceilings shall be more than two feet above the top of the windows, corridors, staircases, and other open spaces, shall be specially ventilated so as to prevent the accumulation of stagnant air.

6. All main drains should, where practicable, be formed outside the building. In the event of its being necessary to carry a main drain underneath a building it must be tapped immediately outside the main wall, and a ventilating pipe must be carried from that point to the highest part of the roof, as under Rule 2.

OF all substances apparently the least likely to be used in the construction of a fire-proof building, cotton would perhaps take the first rank and paper the second; and yet both these materials are actually being employed for the purpose indicated, and their use will probably extend. Compressed paper pulp is successfully used in the manufacture of doors, wall panelings and for other similar purposes, with the result that all risk of warping and cracking is obviated, while increased lightness is attained, and the fear of dry rot is forever banished. Papier-maché, after having served a useful purpose in an obtrusive manner for years as a material for small trays, paper knives, and other such light articles, has now suddenly assumed a still more important position in the industrial world. A still more striking advance has been made in the employment of cotton as a building material. A preparation called celluloid, in which cotton is a leading ingredient, has been used lately as a substitute for ivory in the manufacture of such articles as billiard balls and paper-cutters; and now a Canadian manufacturer has invented a process by which compressed cotton may be used not merely for doors and window frames, but for the whole *façade* of large buildings. The enormous and increasing demand for paper for its normal uses, as printing and writing material, prevents the extended use of papier-maché as a building material, for which it is so well suited in so many ways; but the production of cotton is practically unlimited, and there seems to be a large field available for its use in its new capacity as a substitute for bricks—or at least plaster—and wood. Treated with certain chemicals and compressed, it can be made fire-proof, and as hard as stone, absolutely air and damp-proof, and a material is thus produced admirably adapted for the lining—internal and external—of buildings, of which the shell may or may not be constructed of other material, while it easily lends itself to decorative purposes.

Of Ourselves.

SINCE the issue of our last number some very important changes in the *personel* and management of THE BUILDER AND WOOD-WORKER have taken place. It is hoped that the changes have been such as will prove of advantage to our readers in more respects than one. The reduction of the subscription price from $1.50 to $1.00 per year has been the result of careful consideration and would never have been made had it been thought for a moment that such changes would lower the standard of the paper one fraction or reduce its usefulness one iota. Indeed, we look forward to a large and steady increase of readers on our subscription list, and to the introduction of several new and important features of a useful and practical character in the paper. Neither money nor labor will be spared in making the BUILDER the best journal of the kind ever published in this or any other country for the money, and it is confidently expected by the management that in less than a year from this date the circulation will be more than doubled.

Those who have sent in their subscriptions for next year at the rate of $1.50 per year will get a year and a half for their subscription, or will have their balance returned, just as they may desire. Subscriptions at $1.00 per year must begin with the January number, 1883. No back numbers can be given away under this arrangement.

TED WOOD-WORKER, containing forty-eight full-page plates, with over two hundred separate drawings of hook-cases, tables, cabinets, mantels, over-mantels, chairs, organ-cases, stands, picture frames, hay-windows, stairs, cottages, writing desks, music stands, newel, posts, balusters, hanging shelves, altars, wash stands, sideboards, work bench, wall-tables, easels, wardrobes, &c., &c., together with forty-eight pages of explanatory, and other useful matters. This is the cheapest lot of drawings ever offered the public, and can not be obtained elsewhere for ten times the sum.

"The Hidden Record; or, The Old Sea Mystery," by E. W. Blaisdell, just published by T. B. Peterson & Brothers, Philadelphia, is a love story literally packed with action and incident, the interest of which is of the most intense description. The scene is laid principally in New York, though some of the episodes take place in Cuba and on the ocean. Crime in the metropolis receives a large share of attention, though so perfect is the tact of the auther that nothing revolting is presented, while there is not a line that can shock the most fastidious. The midnight fire-scene, the assault on the old gambling house, and the attack on the robbers' cave, followed by the awful death of Pedro Anteno, are remarkably vivid and startling descriptions, while the ocean scenes are very natural and felicitous, and the love scenes tender and telling. Taken as a whole, "The Hidden Record; or, The Old Sea Mystery," is one of the best, most entertaining and most notably original novels of the day. It cannot help finding a very large circle of admiring readers. It is published in a large square dnodecimo volume, bound in paper cover, price seventy-five cents, or bound in morocco cloth, price $1.25.

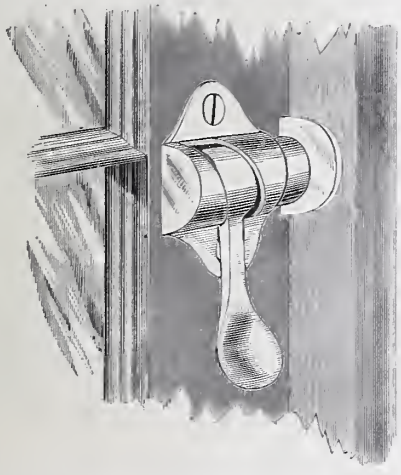
"Claude's Confession," by Emile Zola, just published by T. B. Peterson & Brothers, Philadelphia, is one of the most exciting and naturalistic romances that great author has ever produced. It is founded on Zola's own life, and he himself, under the name of Claude, figures as the hero. The book is a deep and searching analysis of human feelings, and surely the miseries of student life in the Paris Quartier Latin were never set forth in such vivid and startling fashion as in its pages. The translation by George D. Cox, which has been carefully and faithfully made, and reproduces Zola's style so completely that "Claude's Confession" in English reads like an exact transcript of the original. It is published in a large square dnodecimo volume, paper cover, uniform with "Nana," and "L'Assommoir," price seventy-five cents, or bound in morocco cloth, price $1.25.

THERE can be no question as to the fact that W. F. & John Barnes, of 1016 Main street, Rockford, Ill., manufacture the best scroll saws in the world for general purposes. These saws possess extraordinary cutting powers, and will cut equally well stuff one-sixteenth of an inch thick up to three inches thick. For the general workman we should recommend the large sized foot power, as it is capable of doing almost any kind of work within its range, allowing, as it does, a swing of twenty-four inches, with a capacity of 1,200 strokes per minute. For amateurs, the velocipede saw is, probably, the best, as it enables the operator to be seated while at work, a matter of considerable importance to the non-professional workman. These saws, like all other machines made by this firm, are the best of the kind, both as to efficiency and durability.

Besides scroll saws, lathes, boring and mortising machines, the firm also make a very useful and efficient hand circular saw, one that is nicely adapted for use in small shops where all the work is done by hand. Full particulars of all their machines may be obtained by addressing the firm and stating wants.

The illustration shown here is of a window sash-fastener and lock combined. The inventors claim it to be the best in the world. It is said to be so simple that a child can raise, lower or stop the window at any point, with ease.

It can be put on and used without cutting or disfiguring the sash and casing.



It is small, compact, neatly got up, and an ornament to any window.

It has *no springs* to get out of repair or rivets to wear loose.

It can be used a lifetime and still be in good condition.

Any one can put it on in a minute's time, a screw-driver being all the tools needed, saving the expense of skilled workmen.

It is sold cheap, so as to be within the reach of all, the first cost when on being less than the poorest, cheapest thing in the market.

For further particulars address Hyde, Ayer & Co., Box 1471, Springfield, Mass.

Architects and others, who have occasion to make perspective drawings, will appreciate the instruments illustrated in this notice. "The Dexter Perspective Lineal" is now on the drawing-boards of many of the leading architects in New York, Philadelphia, St. Louis, Chicago, and other towns and cities, and has given the best of satisfaction wherever and whenever used. It is certainly one of the best and most useful instruments ever devised for making drawings in perspective. It is plain, cheap, and effective, and just the thing required by the general draftsman.

With the "Dexter Perspective Lineal" the study of perspective becomes a pleasure instead of a task. It can be practiced in the study or school room, requiring no more space than that allotted to any other branch of science.

This apparatus is adapted to any system of perspective.

The apparatus consists of nine curves, a few of which are shown in the engravings, and are employed upon the drawing-board, as shown, for determining the directions of the lines in the perspective. Each curve is stamped indicating its radius. It is only a few minutes' work to adjust all the curves to their proper place on the drawing-board.

The T square of a peculiar construction enables the operator to draw all the vanishing lines toward the imaginary center, called the vanishing point, which is frequently quite a distance from the drawing-board.

The T square is also used to draw the vertical lines as well as for general office work.

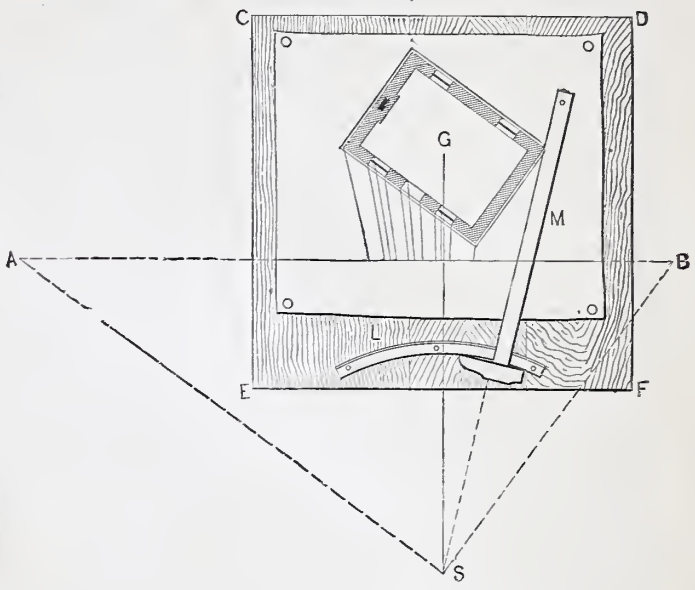


FIG. 1.

In referring to the diagram it will be observed that by the introduction of a curve below the perspective plane in Fig. 1, this device can be used to draw the visual rays from the corners, jambs, etc., on the geometrical plane toward the station point *S*, intersecting the perspective plane of line *A B*, thereby using a smaller board than is usually employed.

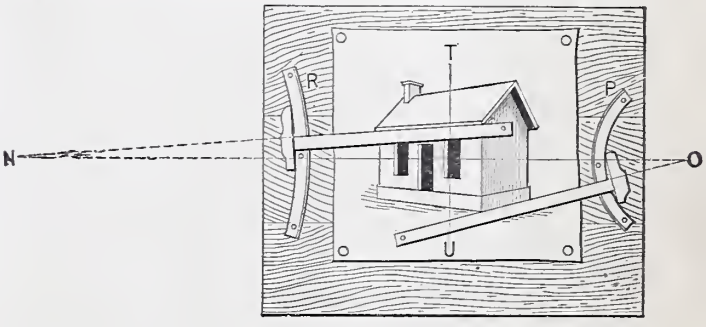


FIG. 2.

Fig. 2 on diagram represents the apparatus as applied to perspective drawing by the introduction of curves, whose radii will be equal to the distance of the vanishing points.

These instruments may be obtained from the inventor and manufacturer, Mr J. B. Sheigle, 20 Newton street, Cleveland, Ohio, to whom address for particulars

---

THE accompanying cut represents the latest novelty under this head—the Magic Water Gauge Reflector for Steam Boilers—we have from the H. B. Smith Machine Co., of 925 Market street, Philadelphia, Pa., who are the sole proprietors, the following statement of its merits: It enables an engineer to see the height of water in his guage glass clearly, even in a comparatively dark room. In cases where boilers are placed in cellars and dark places, it will quickly save its cost in burning gas. It is so arranged as to show a distinct line almost entirely across the Reflector, thus rendering the water line visible from across the engine-room, and materially lessening the danger of explosion from low water in the boiler.

Any one can have a sample Reflector sent, postpaid, for $1.

It is one of those precautions which careful engineers will have.

SEND seventy-five cents to this office for a copy of the "Steel Square and its uses." The best Book for young workmen, in the market.

Send ten cents to this office for "HINTS ON ESTIMATING."

ADVERTISER'S INDEX.

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The Builder & Wood Worker

A JOURNAL OF INDUSTRIAL ART.

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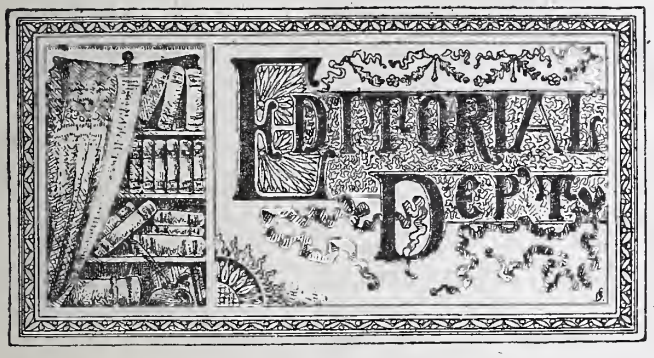


To Our Readers.

ARRANGEMENTS have been made with the proprietor of *The Lumber World* of Buffalo, N. Y., by which his valuable Journal and THE BUILDER AND WOOD-WORKER, will be furnished together for one dollar and fifty cents per year. We consider this arrangement of great value to those of our readers who are in anyway interested in the timber trade. We have also made similar arrangements with other valuable $1.00 papers, such as the *Young Scientist, Wood and Iron,* &c. For particulars see our clubbing list.

WITH this number Volume Eighteen closes, and we are sure that our subscribers will be satisfied with the year's work done, and will feel that we have more than filled the promises given a year ago. While architects, engineers, cabinet-makers and mechanics of all classes are among our readers, and have accorded our paper a hearty welcome, we have never disguised the fact that the BUILDER AND WOOD-WORKER is issued in the interests of operative workmen, and our chief object has been to supply this class with a large variety of modern and popular designs, and to offer the paper at so low a price that every apprentice in the land might be able to secure a valuable library of illustrations and information preliminary to his occupation. Sometimes we may have published things that to the advanced student might have appeared too elementary in character, but our great aim has been to meet the popular want, and we feel that our efforts have been appreciated, if we are permitted to judge from our increased patronage. As regards the future, we have only to say that, although the subscription price has been reduced to ONE DOLLAR a year, beginning with the January Number, 1883, we shall earnestly try to make the paper worthy of continual support. We shall give as much, and in some instances more, in the numbers making up the nineteenth volume, than ever we gave before. Prompt renewals are requested. In conclusion, we may say to all our friends and well-wishers that we wish them, one and all, a merry, happy and prosperous life during the year 1883.

SUBSCRIBERS are requested to send in their renewals for subscriptions before the 20th inst. By doing so they will save us considerable labor in preparing our books for the ensuing year. Bound copies for 1882 will be ready for delivery by the 24th of this month. They will be sent post-paid to any address in the U. S. or Canada for $2.00.

AS the American Institute Fair does not close until the ninth of the present month, (Dec.,) we advise those of our readers who live near by, or who should visit New York before that date, to be sure and call. The Exhibit this year in some departments excels that of any previous year. We may especially mention the fine display of exhaust fans shown by Sturtevent of Boston, Mass., also of tiles exhibited by the Encaustic Tile Co. of New York. Indeed, we could call attention to quite a number of very fine kinds of goods.

A PLAN recently introduced into Belgium for preserving wood from the decay produced by the atmosphere, water, etc., etc.,—is to fill the pores of the wood with liquid gutta-percha, which is said to effectually preserve it from moisture and the action of the sun. The process employed consists in exhausting the air from the pores of the wood and filling them with gutta-percha solution, in poring the solution into the pore. The solid gutta-percha is liquified by mixing with paraffin in proportion of about two-thirds of gutta-percha to one-third of paraffin ; the mixture is then subjected to the action of heat, and the gutta-percha becomes sufficiently liquid to be easily introduced into the pores of the wood. The gutta-percha liquified by this process hardens in the pores of the wood as soon as it becomes cold.

THE recent burning of the Park Theatre, New York, is another forecast of what will surely happen before many years, *i.e.*, a repetition of the burning of the Brooklyn Theatre. What lamentable consequences would have taken place if the fire had occurred a few hours later, no one can describe ; they would have horrified the whole world. The little progress made in rendering churches, and theatres fire-proof since the burning of the great cathedral in Santiago, when over two thousand lives were lost, is not at all creditable to our civilization. Not only are our theatres flimsy and easily

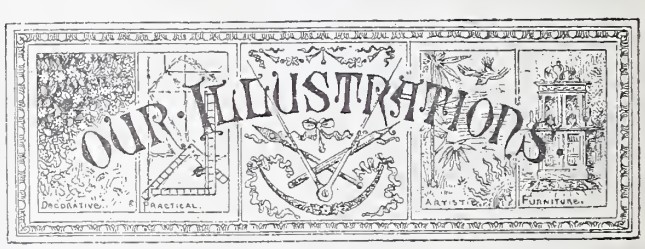
destroyed by fire, but they seem to be designed in such a manner that when once a person gets inside, he is like a mouse in a trap, the way to get out is difficult and mysterious. We do not blame Architects in these matters, they often have no choice, the owners insists on certain things, and they have no option but to obey; and in many cases they are not even allowed to choose the materials of which the building is to be constructed. A thorough, and honest examination of several of the popular places of amusement in New York would bring to light some things that would deter many sensible people from visiting them. Are not our municipal enactments to blame somewhat in this matter?

SOME weeks ago "The American Fire Shield Company" gave an exhibition test of the asbestos fire-proof cloth, at the Brooklyn Navy Yard. A large curtain, one twentieth of an inch in thickness, composed of woven abestos, presenting the appearance of common ducking, was suspended from two straight iron posts. On one side of the curtain, and near to it, was placed two empty tar-barrels, one on top of the other. On the other side of the curtain and distant from it about two feet, was a large pile of dry wood, which had had tar over it and was saturated with kerosene oil. This pile was set on fire, the flames rising beyond the height of the curtain and driving the spectators back fifty or sixty feet. The effect upon the asbestos curtain, which was enveloped in the flames for about an hour, was only to slightly discolor it. while so far from the tar-barrels at the back becoming ignited the curtain was not heated through. The experiment was conducted by the Secretary of the company, and was witnessed by several naval officers and other persons interested in appliances for the prevention of fires.

The American Fire Shield Company claim that this cloth is eminently adapted for stage curtains in place of the inflammable baize now commonly used. The new material may easily be decorated with asbestos fire-proof paint. For its effectual use, however, as a fire-proof stage curtain, it is admitted that a change in prosceniums of theatres as at present constructed would be necessary. The cloth is not intended for stage curtains only, but can be applied to fire-saving purposes in different ways.

SINCE the burning of the Ring Theatre in Vienna, an Imperial decree has been passed by which all theatres built from this date are to be completely detached. The stage is to be divided from the auditorium by a wall not less than 20 inches high and 18 inches thick above the roof, so that in case of fire the stage may be isolated from the rest of the house. The stage must be of sufficient height for the curtain to be raised without being rolled. No one is to be allowed to live in the theatre, and the stage carpenter's shops, the stage appliances, and the refreshment bars are to be outside the theatre, this latter regulation to be applied to theatres already in existence. All the dresses worn by the actors and actresses are to be dipped in a preparation which makes them more or less fire-proof, and no explosive matter is under any pretense to be left in the theatre. Very strict provisions are made with regard to the seating of the theatre, so that there may be plenty of room for easy exit, and the prefect of police is to have the power of deciding how many firemen shall be allotted to each theatre. The manager of the theatre is to be held personally responsible for the carrying out of all these regulations down to the smallest detail, and he will be severely punished if, upon the very first alarm of fire, he fails to give the public notice.

THERE is at present at the Madison Square Art Rooms, N. Y., an exhibition of bric-a-bric which, besides bronzes, faïence, porcelain, rugs, and the usual articles of temptation to connoisseurs and collectors, contains some exceedingly artistic specimens of wood-working. The great majority of these pieces consists of carved wood from Nuremberg of the eighteenth century, and of the famous Lippman productions of Louis Quinze art-furniture. Lippman is not a copyist. He is a true reproducer, and has not fully recovered the very spirit of the epoch, but has certainly rediscovered the famous "vernis de Martin" so prized by collectors of antique furniture. The essential aim of Louis Quinze woodwork was to bring out forcibly the qualities of various ornamental woods, their beautiful graining, their exquisite mottlings, cloudings and modulations and their native colors. This is done by artful combinations and contrasts of woods of different hues and qualities, as French walnut, oak, ebony, rosewood, mahogany and amaranth. The effect of these combinations when brought out by the famous Martin varnish is charming, and one or two pieces of this furniture will add a surprising lustre to a room decorated in the prevailing style. Mention should also be made of some specimens of Parsee carving in unstained teakwood. It is curious to trace in the decorative motives of this very artistic ware the old Assyrian spirit of design. The idea used to be in every piece the same, namely, foliage in which are birds and beasts and hunters presented in a beautiful network of perforated carving. But of late years the Parsis of Bombay have commenced to make great progress, and have applied in their carved wood motives which they have certainly taken from old German mediæval work. One of the tables in this collection shows in its supports evidence of this. It cannot be denied that as far as relates to wood-work the Renaissance, with its eternal reference to the human form, did more harm than good and was not suited to the material. The old Augsberg and Nuremberg carving, before the Renaissance overwhelmed everything with its flood of Hellenicism, was exquisitely artistic. That the Parsees have gone back to that epoch for instruction is a proof of their true feeling for wood-carving.



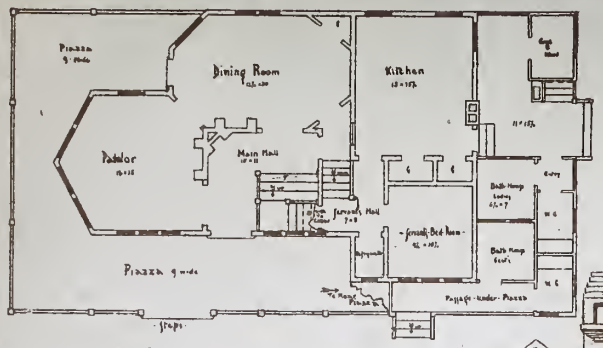
ON Plate 89 we show the side elevation of a very attractive and quaint looking cottage to be erected this fall at Bay Head, N. J.

The plans were prepared by Mr. Fredk. B. White, architect, of Princeton, N. J.

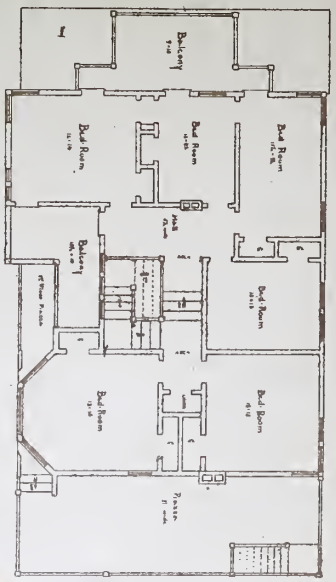
This cottage is nearly 65 feet long and 34 feet wide. On the first floor is a square entrance hall 11x15 feet, out of which open the parlor and dining-room. A door also leads from the main hall to the rear hall, from which access is obtained to the kitchen, servant's room, store closets, cellar, etc.

Up stairs there is a gallery overlooking the hall, which gives a very pleasing and airy effect. On this floor there are six good sized bedrooms, from three of which, as well as the hall, we open out upon up-stair balconies. There are good large closets connected with every room. The cost of the house complete will be about $3,500.

Plate 90 shows the front elevation of a cottage designed by David S. Hopkins, architect, Grand Rapids;



~ First Floor ~



~ Second Floor ~

COTTAGE · AT · BAY-HEAD · N·J·

FREDK · B · WHITE ··· ARCHITECT ·

PRINCETON · N·J·

Mich. The designer calls the cottage "Multum in Parvo," and says,

"I think the name not amiss. This is a cottage I have just completed for myself, not desiring to build an expensive one. There were many desires to overcome but I kept within a certain limit, and I leave you and the patrons of the BUILDER AND WOOD-WORKER to judge how well I succeeded.

"This cottage cost, all complete, including plumbing, $2,700. The best rooms are finished in butternut and walnut. Pilaster finish, with solid butternut doors. By a careful observation there will be seen several novel features about the design.

"Stained glass transoms over all windows in principal rooms for purposes of ventilation and light.

"Economy of cost means economy of room and general compactness, which were strictly adhered to in this. The cottage is one that is much admired by all who see it for a small family house, and exteriorly it is considered a 'joy forever.'"

Plate 91 shows a side elevation and plans of the cottage shown on the preceding plate.

Plate 92 shows a portion of a library, and is very handsome. It is the work of Mr. Dewson.

Plate 93 shows a number of random sketches from the portfolio of Mr. Dewson. There are many things in it that will be useful to most of our readers.

Plate 94 shows a series of exeellent designs suitable for amateurs and designers.

Plate 95 is in recognition of the still increasing demand for wood mantels. We this month publish a couple of examples from our Talbert Portfolio. The one at the top has the merit of being more in the prevailing Queen Anne style than most of the designs by this artist. The one below is a still plainer example of the same character, and will be useful when something very simple is required. The grates in both these cases may be suggestive to our hardware manufacturers.

Plate 96 is in illustration of the articles on stair-building, and a full explanation is given elsewhere.

The Mathematical Knowledge of the Mechanic.

IT appears strange that operations in the mechanical arts requiring, in many cases, mathematical accuracy, should be left to the care of workmen who have no mathematical knowledge. It is true that such work is often executed with admirable precision and dexterity, but this is simply the result of long and arduous practice, without any advantage of method or rule, unless it be that too well known by the name of rule of thumb. This should not be; for not only would such work be more quickly and satisfactorily exeeuted by help of those mathematieal rules by which in the drawing office such machinery is always designed, but the maker and designer would be brought into closer relationship, and the master-hand would become the natural coadjutor of the master-mind. The writer remembers a young gardener, by no means diligent at his proper work, but considerably given to amateur carpentry, by help of which he had contrived to produce a tolerable wheelbarrow. Not having a carpenter's square he used his two-foot rule, which he had pressed into unwonted service in the following manner: having earefully set one blade at right angles to the other, by making use of an angle of a square table as a guide, he bored a small hole at one end, through which he passed a string knotted at the end; he then measured across to the other blade, and cut off the string. Thus, whenever he desired to use his rule as a square, he simply opened it till the string exaetly reached from one leg to the other, and the required right angle was laid down with tolerable aecuracy. Afterwards, however, finding the string somewhat in the way, two marks were made upon the work-bench at the required distance asunder, whereby the same measurement was obtained. Here was obtained a practical solution to the problem, given two sides of a right angled triangle to find the third side. Take another case, a metal worker desiring to grind the bevelled edges of a slide to an angle of 60 degrees, and, having no protractor or goniometer, was about to give up the task, when by chance he was directed to form the required guage by cutting out an equilateral triangle from a sheet of tin. There are, in short, many very simple mathematieal truths, which would be of extreme serviee to working men in the praetical execution of their work, and whieh would still further aid that inventive genius frequently found among them, but which fails to develop itself solely for want of a knowledge of the principles of practieal mechanics. What a vast amount of time and labor have been expended in designing that *ignis fatuus*, perpetual motion, once an absolute mania, as the pages of old mechanieal publieations witness; and, still far from extinct, this passion for designing a *perpetuum mobile* crops out from time to time even in our enlightened age in divers speeifieations sent to the patent office under the head of "prime movers," or motive powers. Nineteen-twentieths of these are based on unsound mechanieal data, which could not have been entertained for a moment if the designers had possessed even a moderate degree of mathematical knowledge. But in addition to this, the very study of mathematics tends to quicken the intelligenee of the workmen upon all points connected with his trade, and raises him above the general level of handicraftsmen. In every instance within my knowledge a workman thus instructed has became a marked man, and his manipulative skill has kept pace with his intellectual attainments. It would well repay the employers of such skilled labor to provide their men with a few books and instruments, and to encourage them to employ spare time in the pursuit of this elevating and delightful seience.

To Join the Ends of a Band Saw.

FILE the ends of the saw on opposite sides to form two wedge shaped ends, having a lap of say, from $\frac{3}{4}$ to $1\frac{1}{2}$ in., according to width and thickness of plate; a thin narrow plate for light work, like ordinary scroll sawing, $\frac{3}{4}$ in.; a wide saw, say 4 or 5 in. in width, by No. 16, 17 or 18 gauge, or $1\frac{1}{2}$-in. lap. When the two beveled sides are laid together, they must form a joint of the same thickness as the blade. Now make two pairs of tongs with heavy jaws, long enough to cover the width of the blade; have the jaws straight and shut closely; cut a notch in a piece of about 6 by 6 joist for wide saws and smaller for narrow saws; have the notch large enough and covered or plated inside, so that it will not be burned by the hot tongs; now clamp the saw on the joists, so that the laps will come over the notch; the joists should be say, 4 ft. in length, and mounted on legs like a saw-horse; now cover the lap with the muriate of zinc or borax water, placing a piece of very thin silver solder or fine spelter solder in the joint. If spelter be used it may be mixed with borax water and spread between the joints. (Silver solder however, is preferable to spelter.) Now heat one pair of tongs to a bright cherry red, scrape off all the scale, &c., between the jaws; now clamp the joint to the brazed, using the cold tongs to clamp the points of the hot tongs; hold them a sufficient length of time to melt the solder; have the other pair of tongs warmed to about the heat of a sad iron; now carefully draw the hot tongs off toward the back of the saw, having the back rest firmly against supports so that the saw cannot move edgewise; have another person follow up the hot tongs with those merely warmed; hold the grip with the warm tongs until the joints are fairly set, when nothing remains to be done more than to file

off the surplus solder. The above process will be found much better than cooling off the joints with water, as it is liable to harden and crack the blade. The soldering and cooling tongs should be made heavy and strong. The cooling tongs should not be used entirely cold, as the sudden chilling will harden the plate. If the process be properly performed the saw will be of the same temper at the splices as at other parts.

Suggestions.

A LARGE proportion of the men working in our cabinet shops seem to have ideas and plans connected with their ordinary daily work which, though not absolutely wrong, are so far removed from the correct method, and sometimes so much opposed to nature, as to cause a great deal of extra labor and annoyance. Amongst these mistaken notions might be mentioned the various plans adopted by them to bring wood, when warped or twisted, back to the proper, or rather the required, condition. It is very often found to be the case, that wood, which in the board or plank is perfectly straight, or which at least appears to be so, will twist and wind in every conceivable manner when freed from restraint, and cut up into long narrow lengths, or cross-cut into short broad panels. When wood is very badly turned—*i. e.*, when it is in what is technically termed "winding"—the only remedy is to plane off the high corners, and thus make it perfectly true by reducing the thickness. But if it be simply cast, one side being hollow and the other round, the defect may be easily got over. If the man, by working on some other portion of the material required for his job, can let the defective pieces stand by for a day or two, then by placing the wood "hollow side" down on a plane surface, or by putting two such boards one on the top of the other, with the hollow sides facing each other, the wood will be drawn straight without any more trouble on the part of the man. It is always best, when possible, to work up the wood in its natural state, as even if the tendency to cast be overcome previous to working it, there is always the probability of its returning to its normal condition. Some men, when pressed for time, heat the round side on the stove. This does indeed make the wood straight, but there is a great risk of the wood opening and splitting under this toasting treatment, and this liability is very much increased if the wood be at all shaky. If required, the wood can at once be straightened without this risk, by damping the hollow side with water, when the expansion of the fibre on that side pulls it straight. It sometimes happens that a piece of wood of some considerable width, such as a carcase end or a wardrobe panel, has to be reduced from $\frac{3}{4}$inch to $\frac{1}{2}$inch thickness. If this superfluous wood be all taken off one side, that side will become hollow, whereas if it be taken off equally on both sides the wood remains as before.

In veneering panels, etc., it is always best to veneer on the outside, that is, the side opposite the heart side, the reason for this being that veneer is apt to swell with the glue being laid on, and must therefore contract after it is fixed. As the heart side has always a decided tendency to curl, the two forces counteract each other, and the wood remains the same. For this same reason, it is always best to inlay on the outside.

To some people, these may appear to be very trivial matters, but it is by keeping these and other little points in mind that a job may be turned out with more comfort to the man and satisfaction to the employer, and these hints, if carefully attended to, will frequently save time and expense to both master and man.

SEND seventy-five cents to this office for a copy of the "Steel Square and its uses." The best Book for young workmen, in the market.

Stairs.

FIFTH PAPER.

PLATE 95 represents the formation of carriages for the elliptical stairs in plate 88. Fig. 1 is the longest carriage, or rough-string, and is formed of one deal, 11 inches wide by 3 or 4 in thickness; its length of bearing betwixt the walls is about 15 feet. To find the best position for the carriages, lay a straight edge on the plan, and by its application find where a right line will be divided into nearly equal parts by the intersection of the risers. The object of this will readily be understood if it is considered that in a series of steps of equal width and risers of equal height, the angles will be in a straight line, whereas in a series of unequal steps and equal risers, the angles will deviate from a straight line in proportion to the inequality in the width of steps. Notwithstanding the inequality in the width of steps, which thus often occurs, it seldom happens that carriages may not be applied to stairs, if their situation be carefully selected by the means above mentioned. The double line AB is taken from the plan (Fig. 1, No. 1, plate 88), with the lines of risers crossing at various angles of inclination. These lines represent the back surface of each riser, according to the number on each. The double line AB will therefore be understood as representing the thickness of the piece. Lines drawn from the intersections of each of the risers perpendicularly on AB (Fig. 1, plate 96), will present the width of bevel which each notching will require in the carriage at the junction of the wall. No. 8 crosses very obliquely; No. 9 with somewhat less obliquity; No. 10 with still less, and the obliquity continually diminishes, till at 13 the crossing is at right angles, presenting only one line. The remaining numbers are beveled in the reverse direction, gradually increasing to No. 19, where the carriage enters the wall. The complete lines show the side of the carriage next the well-hole, whilst the dotted lines represent the side next the wall. The most expeditious method of setting out such carriages is to draw them out at full size on a floor. Having first set out the plan of the stairs at full size, take off the width of every step, in the order in which it occurs, marking that width, and at right angles thereto draw the connecting riser, thus proceeding step by step till the whole length of the carriage is completed; next set out one side of the carriage as a face side and square over to the back, allowing the bevel as found on the plan; then, with a pair of compasses prick off to the under edge at each angle, for the strength; this will define the curvature for the underside with its proper wind, to suit the ceiling surface of the stairs. The bearer, CD, Fig. 1, No. 1, plate 88, is a level piece wedged in the wall, with its square end abutting against the side of the carriage, AB; the dotted line on the upper side of the carriage, Fig. 1, plate 96, and the straight dotted line on its under side, are intended to show the edges of an 11-inch deal previous to its being cut; the shaded part at each end shows its bearing in the wall; at the riser 18 is shown a corpsing, to receive the lower end of the carriage, figure 3, CL; and at the riser 16, a similar corpsing to receive the carriage, Fig. 4, GH; Fig. 2 is the carriage, EF Fig. 1, No. 1, plate 88, parallel with AB, Fig. 1, against which the front string is nailed; each of the last mentioned is formed in the same manner as the one already described.

This method of framing the carriages of stairs is not yet much practised. It was introduced by the author more than thirty years ago, and has given greater satisfaction than the more laborious process of framing for every step which is not only weaker from the greater number of joints, but is also more expensive. It is now gradually coming into use.

In circular strings the string board for the circular part

PLATE No. 90

"MULTUM IN PARVO."

SCALE 1/4" TO ONE FOOT.

FRONT ELEVATION.

D. S. HOPKINS, ARCH'T.
GRAND RAPIDS, MICH.

PLATE No. 91

is prepared in several different ways. Each of these will now be described, the first being that adopted in veneered strings.

One indispensable requisite in forming a veneered string, is called by joiners a cylinder; it is, however, in fact, a semi-cylinder joined to two parallel sides. An apparatus of this kind must first be formed of a diameter equal to the distance betwixt the faces of the strings in the stairs.

Take some flexible material, as a slip of paper, and measure the exact stretch-out of the circular part of the cylinder, from the springing line on one side, to the springing line on the other. Lay this out as a straight line on a drawing-board; then examine the plan of the stairs, and measure therefrom the precise place of each riser coming in contact with or near to the circular part of the well-hole as it intersects on the line of the face of the string, and also the distance of such riser from the springing-lines. These distances should all be carefully marked on the slip of paper and transferred to the drawing-board; then, with the pitch board, set out the development of the line of steps, by making each step equal to the width found, and connecting with it at right angles, its proper height of riser. When the whole development has been set out on the drawing-board, mark from the angles of the steps downwards the dimension for the strength of carriage; by this means it will be seen what shape and size of veneer will be required. The whole of the setting out must now be transferred to the face of the veneer; then with the point of an awl prick through the angles of the steps and risers, and trace the lines on the back as well as on the front; the veneer must now be bent down on the cylinder, bringing the springing lines and center lines of the string to coincide as exactly as possible with those of the cylinder; the whole string must then be carefully backed by staving pieces glued on it, with the joints and grain parallel to the axis of the cylinder; the lines on the back of the string will serve to indicate the quantity of the veneer to be covered by the staving; the whole must be allowed to remain on the cylinder till sufficiently dry and firm; it is next fitted to the work by cutting away all the superfluous wood as directed by the lines on the face of the veneer, and then being perfectly fitted to the steps risers, and connecting string; it must be firmly nailed both to the steps and risers, and also to the carriages; each heading joint in the string should be grooved and tongued with a glued tongue.

There is another method of gluing up the strings sometimes practised. In this the string is set out as before described, but instead of using a thin veneer, an inch board is taken, on the face of which the development of steps, risers, springing, and center lines must be carefully set out as before; the edge of the board must be gauged from the face, equal to the thickness of a veneer, which would bend round the cylinder; the string must then be confined down on the work-bench, and grooves made by a dado plane on its back in the direction of the riser, and at about half an inch distant from each other, till the whole width of the cylindrie surface is formed into a series of grooves; these grooves are then filled with keys of wood which are placed in as the string is bent round to the right curve.

A Chat About Mitres.

IN almost every piece of furniture that a cabinet maker has to manufacture, one of the most important things to be done, after having framed the job together and got the "skeleton" finished, is to mitre in the mouldings, etc. To one unaccustomed to examining the detailed construction and manufacture of cabinet work, the amount of mitring on any ordinary article of furniture such as a wardrobe would be truly astonishing. There are the mouldings to be mitred in the door frames, the mouldings, maybe, on the drawer fronts, the facings and mouldings on the cornice and plinth, and should the front of the job be broken by pilasters fixed on the doors, the mouldings of the cornice and plinth will have to be mitred round these also. Consequently there are a great many contrivances (some of which are purely local), known to most cabinet makers, which are calculated to assist the workman, and remove some of the difficulties which mitring entails. Most of these, such as the mitre "cutting block," mitre "shooting board," etc., can be bought at any tool shop; but the one generally called the "mitre trap" cannot be bought at any tool manufacturers, and though well-known to the majority of workmen in the form of the finished article, the method of making such a tool is not so univer-

Fig. 1.

End View.

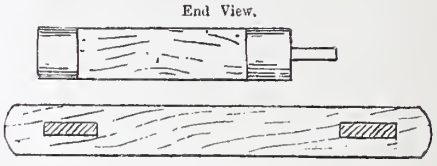


Fig. 2.—Front View

sally known. To many artizans, therefore, a short description of how to make such a tool will, we trust, prove of service to our workman readers. One form of mitre trap is shown in Fig. 1. It consists of three blocks, the faces of two of them being cut at an angle of 45 degs., which work in a frame by means of a screw.

To make this tool, first get out the wood for the frame, which is separately shown by Fig. 2. The inside size will be about 18 inch by 8 inch. This frame will for appearance sake be mortised and tenoned together, although of course it would do quite as well if dovetailed. The two ends must be cut about 15 inches by 3 inches, and 1½ inch thick, and the two longer pieces 24 inches by 3 inches,

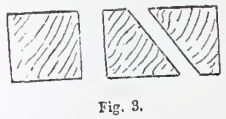


Fig. 3.

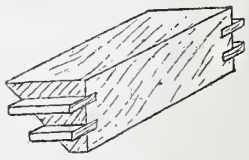


Fig. 4.

Fig. 5

and 1½ inch thick. As will be seen from Fig. 2, which is a front and end elevation of the frame, the tenons are left projecting over the front pieces about 2 inches, but only on one side. The use of this will be seen later on.

When this has been framed together "dry," that is, merely knocked together without being glued, and the projecting ends of the frame nicely rounded off, it must be laid on one side while the blocks are being prepared. The number of these latter is in a measure dependent on the will of the workman, as only two blocks are absolutely required, the mitre being cut by the wood being placed between. But as by the addition of one block the mitre trap may be used for "shooting" the ends of drawer fronts and such like, it will be much better to have three blocks. Cut these out, therefore, each 8 inches long by 3 inches square. After fitting these to the required

length, so that they will work easily up and down in the frame, two of them are required for the mitre, a section of which is shown by Fig. 3. The other block must be left square. Now, take the frame to pieces, and work a couple of grooves along the inside of the two long sides, and across the end of the three blocks. Cut out and fit two tongues of hard wood into each of the grooves in the end of the blocks, which will now be of the appearance shown in Fig. 4.

The frame must now be glued together, the blocks being put in the order shown by Fig. 6, the grooves in the frame, and the tongues in the blocks allowing the

Fig. 6.

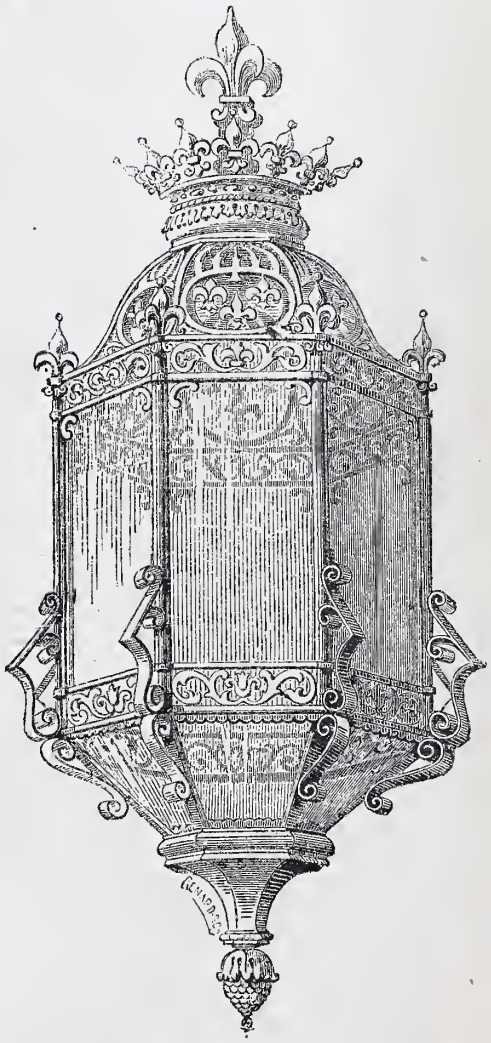
blocks to move backwards and forwards in the frame. A screw must next be procured out of a piece of box-wood, and must measure about 16 inches in length, including the handle, and about 1 inch in diameter on the thread. In order to attach the end of the screw to the block, a plate of brass about 2 inches by 1 inch, must be fixed on to the end of the screw at A (Fig. 5), in such a manner that it will, when screwed on to the block marked B on Fig. 6, work the block backwards or forwards by simply turning the handle. The tool will now be of the shape shown in Fig. 6, which is a section cut right through the centre. To make a mitre, the wood must be placed between the blocks C and D, and then planed down to the level of the frame. To shoot a piece of wood square it must be placed between the blocks B and C. The best wood of which to make this tool is mahogany, though any hard wood will do. To fix it on the bench, place a holdfast on one of the projecting tenons, and screw firmly down.

Decorative Panel.

MR. TALBERT'S treatment of panels, is always distinguished by suitability, and just sufficient conventionality to make the subjects decorative. The clever study for a figure panel reproduced here shows that his talented pencil was not confined to one class of subjects. This panel was designed for a sideboard, and Mr. Talbert's rough sketch, seems to indicate that the ground work (ruled across in the engraving) was intended to be finished in dead gold.

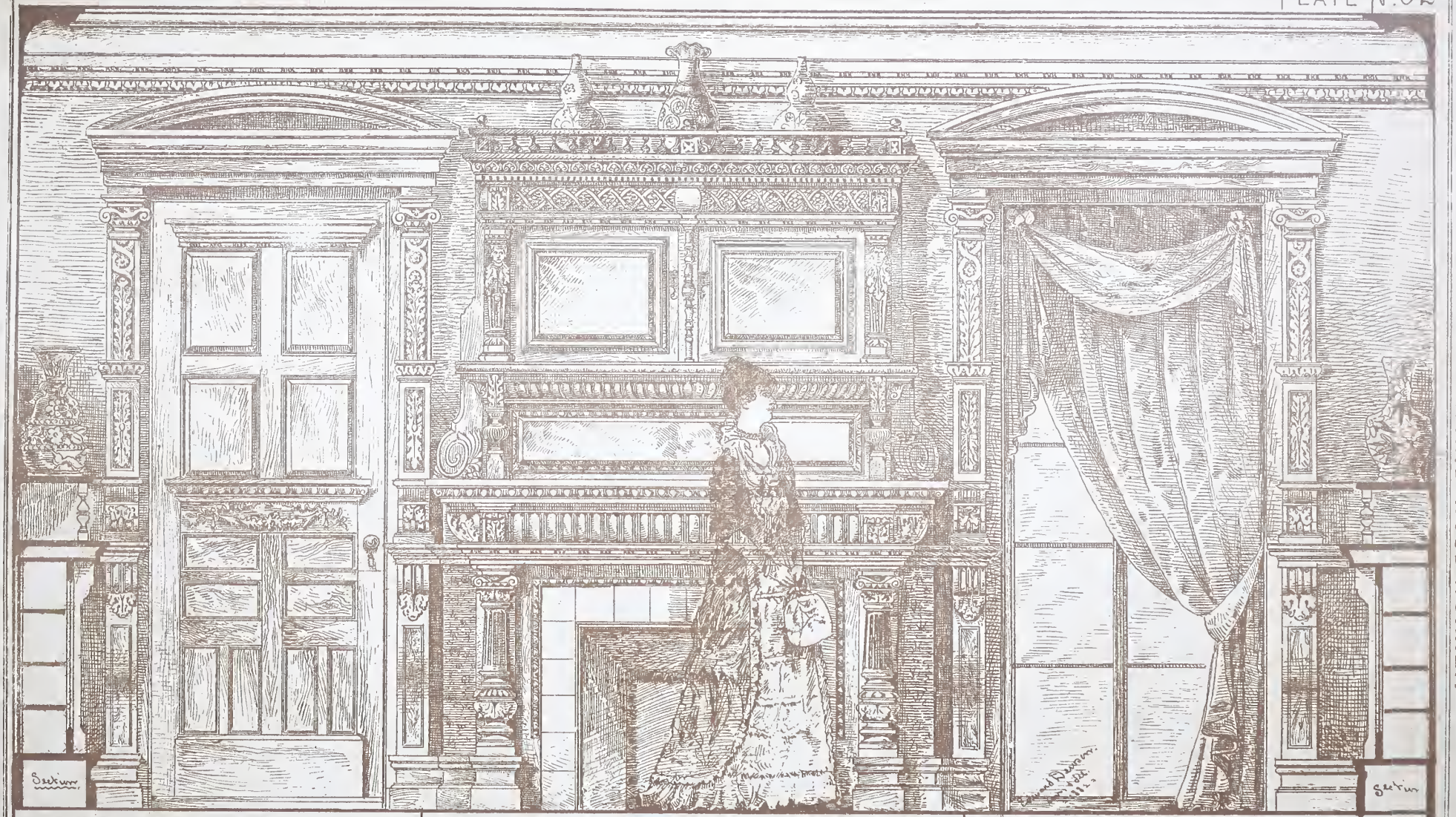
Ornamental Wrought Iron Work.

ORNAMENTAL wrought iron work is coming more into use of late, than formerly, still its progress is very slow. One of the finest pieces of work in New York city, is the grille over the grand entrance of the Mills Building on Broad street. This is deservingly admired by every person who is capable of judging of its merits. We present two illustrations of wrought iron work, that are full of artistic merit. One is a mirror



Wrought Iron Lamp.

frame on an appropriate ground, the other is a hanging lamp or lantern. The mirror frame and lamp, would make an artistic addition to hall or vestibule. The Brothers Ferdinand of Paterson, N. J., manufacture these and similar work. Excellent specimens of their handicraft were exhibited at the "American Institute Fair" a year or two since, which doubtless resulted in large orders for their work, as we are very sure they merited such.



SPECIAL HOLIDAY NUMBER

STUDY FOR A LIBRARY INTERIOR

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EDWARD + DEWSON
ARCHITECT
+ BOSTON
10 PEMBERTON SQUARE - ROOMS 16 & 17
Library Chair

WROUGHT IRON MIRROR FRAME.

Now is the time to renew subscriptions to the BUILDER AND WOOD-WORKER. One Dollar a year, commencing with the January number, 1883.

Improvement in Band Saws for Fret Work.

AN English journal calls attention to an invention, recently patented, by which the connection between the two ends of a band saw is formed in such a manner as to be detachable. The junction of the two extremities of the saw is effected by means of a hook or interlocking joint. A portion of the saw near each extremity is reduced in thickness in such a manner that when the two extremities are held together the two points do not exceed the thickness of the remaining part of the saw. Portions of the back and front of the extreme ends are also cut away so as to leave narrow tongues at each extremity of the saw. These tongues are provided on opposite sides relatively to each other with hooks. In the thin portions at the extremities of the saw there are formed, at equal distances from the tongues, two longitudinal slits or openings, presenting bevels or inclined surfaces at the edges nearest the ends of the saw corresponding exactly to the hooks on the tongues. The opposite end of each opening is also beveled or inclined, but at a much more acute angle, so as to form a recess in the side of the saw for the reception of the extreme end of the corresponding tongue, which is suitably reduced in thickness toward the extremity in order to enable it to be well within the said recess. In order to join the two ends together the two tongues are introduced simultaneously into the two corresponding openings. The ends of the saw are pressed together laterally in such a manner as to cause the hooks on the tongues to engage with, or hook on to, the beveled edges in the openings. The thin ends of the tongues then lie in the inclined recesses in the sides of the saw. When the parts are in this position, the two extremities of the saw cannot be spread either by external strain in the direction of its length, or by a diminution of the tension. To disconnect the ends of the saw it is simply necessary to spread the hooked and beveled edges by applying lateral pressure, and at the same time draw the extremities apart in opposite directions.

[THE Editor does not hold himself responsible for any opinions that appear in this column. Contributions are solicited from all who are interested in building operations, or wood-work of any kind. Letters will be judged entirely by the style of the writer, the merits of his subject, and the knowledge which he displays of it. The name and address of the writer must accompany each letter, not necessarily for publication, but as an evidence of his good faith. Be brief, courteous, and to the point.

[Rejected communications can in no case be returned.]

Editor BUILDER AND WOOD-WORKER :

AS very little has ever appeared in your columns in regard to the most suitable woods for various compartments, I would like to present my views, which of course will be open to criticism. I will commence with the parlor and library, as these two rooms are not in constant use it is hardly necessary that they should be as bright and cheerful as the living or dining room, nor should they be finished in saloon style as some I have seen, in dark and light woods ; this is very much out of place, they should be in some dark woods of uniform color or as near so as possible. I am at present putting up a heavy architrave and base of foreign walnut which makes a perfect finish. Rosewood, red-cedar, mahogany and gum do very well for the parlor and library, but should be worked alone, not with other wood. The hall and living room should be in lighter woods which may be worked together, but care should be taken not to make too much of a contrast. Oak and cherry make a very neat wainscoating or dado. The following may be worked together with harmony: White and red-oak, oak and cherry, cherry and satan wood, ash and cherry, maple, and quartered oak, cherry and birch and any other woods of similar colors. Southern pine makes a fine finish for living and dining rooms, it will take a very high polish and is light and cheerful.

Most of our grand staircases in this section are built of oak or cherry and frequently mixed oak steps and risers with cherry balusters and rail. All hardwood finish should be secret nailed as nail holes puttied look very bad, in fact spoil the effect.

Yours &c.,
J. L. N.,
Decorater and Furnisher, Bloomington, Ill.

W. J. C., Allegheny, Pa.—Write to Thos. Moloney, Jackson, Mich., for a copy of the *Builders' Journal*.

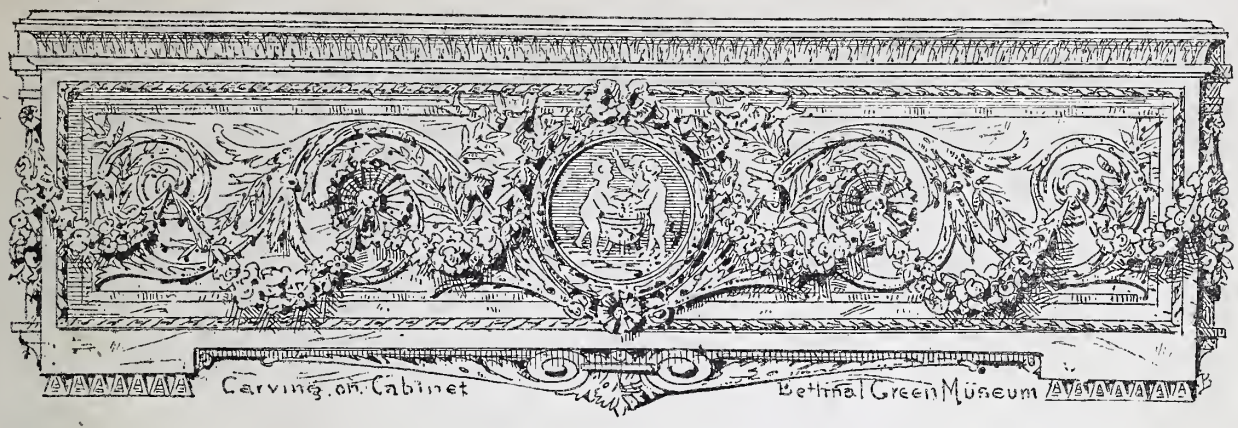
We will shortly give some methods for laying out segments, gothic arches, hips, etc.

Yes; Gould's *Carpenter's and Builder's Assistant* is a pretty good book for a young carpenter. "Bell's Carpentry" is also an excellent work.

O. A. M., Brattleboro, Vt.—Thanks for your good opinion of us. We intend to give a number of illustrations suitable for amateurs during the coming year.

E. G. C., Allegheny, Pa., says: "I am an amateur in wood-carving and cabinet work, and would be pleased to receive some advice on the subject. I am attending school, and have not very much spare time. I would like to know what I had best try my hand at first? I do it merely for amusement, and would like to know what I could make for home that is simple and useful, and at the same time beautiful?"

You have asked us a question that is very difficult to answer, as we do not know how far advanced you may be. We suppose, however, that you are pretty well up to the use of tools, and are able to carve panels, sides for book racks, corners for picture frames, pedestal stands, etc, In that case you might make carved lids for work-boxes, desks, collar and cuff boxes, jewel caskets, etc. You might also try your hand on window cornices, cabinet doors, mirror frames, and a host of other things. We have reproduced a



A PRETTY PIECE OF CARVING

number of excellent designs for carving during the last year that you might follow to advantage.

W. S., Trenton, N. J.—From the circumstance that man's past experience has been acquired in the treatment of wood and the softer metals which admit a higher velocity, the earlier attempts to bore and turn cast-iron on a large scale failed, because the force was applied in a wrong condition. As experience was gained, it became apparent that a much slower velocity, combined with great pressure, was necessary, which entirely overcomes the difficulty. The range of velocity found most suitable for different substances lies rather wide. Cast-iron requires a slower motion than wrought-iron, and may be said to range between twelve to twenty feet per minute, according to hardness. Sandstones, from their structure, require a slower motion in the planing machine when being shaped into blocks or columns, and a slower motion still is found necessary by granite turners, where the action is detrusion and the edge of the detruding instrument or dise moves in unison with the granite column. Going in the other direction, the limit of speed has scarcely been reached. A velocity of 8,500 revolutions per minute is employed in the fine cutting of wood; and even then high speed is not found to heat the instrument to a degree which would necessitate discontinuance of the operation. It is different when the piece of wood itself is driven at that high speed, as in the case in wood-turning, because from the friction exerted on one point only the temper would be taken out of the cutting instrument. This remarkable difference arises from the swift revolution of the cutting instrument, where two new conditions are found to step in. The first is that due to the extent of the cutting points. When each acts in turn, they give a momentary rest to all the other points. Secondly, the instrument whirling at such a high velocity is in the position of a blowing-fan, and is thereby kept cool by the presence of the atmosphere.

R. T., Washington, D. C.—The staining of white woods in various patterns, in imitation of inlaid woods, is a subject to which some attention has been paid by an English firm, and the following valuable decorative process, as proposed by them, will not be without interest: The surface to be decorated is made as smooth as possible, and is then covered with one or two coatings of size, prepared by adding to glue size of just sufficient strength to form a jelly, a little egg albumen and a small quantity of alum. When this is dry and thoroughly hardened, the design must be traced or pounced upon it. The outline and those lines separating the different parts of the design, and all other parts that are to retain the natural color of the wood, are then carefully painted in with Brunswick black or Canada balsam, laying on the black with a good body. This should remain until it gets thoroughly hard, which will be in about six or seven hours. The surface is then washed with a sponge and lukewarm water until all the size is removed from the exposed parts, the pattern drawn in the Brunswick black, which is impervious to water, remaining intact, and serving to prevent the stains running together when being applied. This washing must thoroughly remove all the size preparation, and after the wood has been allowed to dry it will be ready for the application of the colored stains. If the painting has been properly done, the design will appear as a clear black outline enclosing the white spaces, which are to be filled in with various colors, after which the black outline is to be removed, as will be explained. The black lines should be fully a sixteenth of an inch wide, and wider if required. Having decided upon the woods to be imitated, and the colors to be used, the stains, which may be either spirit stains or water stains, or both, may be laid in. The lightest stains must be put in first, and need not be confined to the exact outline of that particular part, but it is well that they should be. The stain may be freely used, and laid as level as it will allow, but a little shadiness is not at all objectionable. The next darkest stain may now be proceeded with, and so on for as many stains as are desired. When all are dry and hard, the black outline may be washed clean off the wood with a brush and turpentine, which may be freely used until the whole of the Brunswick black is removed. The various colored stains will then appear inclosed in a white outline, which, if properly done, will be sharp and clean, and clear as an inlay of the real woods. What grain the white wood has will be more or less seen through the stains as they may be light or dark.

ITEMS OF INTEREST

Oil Varnish.—Coarsely powdered copal and glass, each 4 oz.; alcohol, 64 o.p., 1 pint; camphor ½ oz.; heat the mixture with frequent stirring in a water bath, so that the bubbles may be counted as they rise, until solution is complete, and when cold decant the clear portion. When oil varnish is used, it is made as for artists' virgin copal.

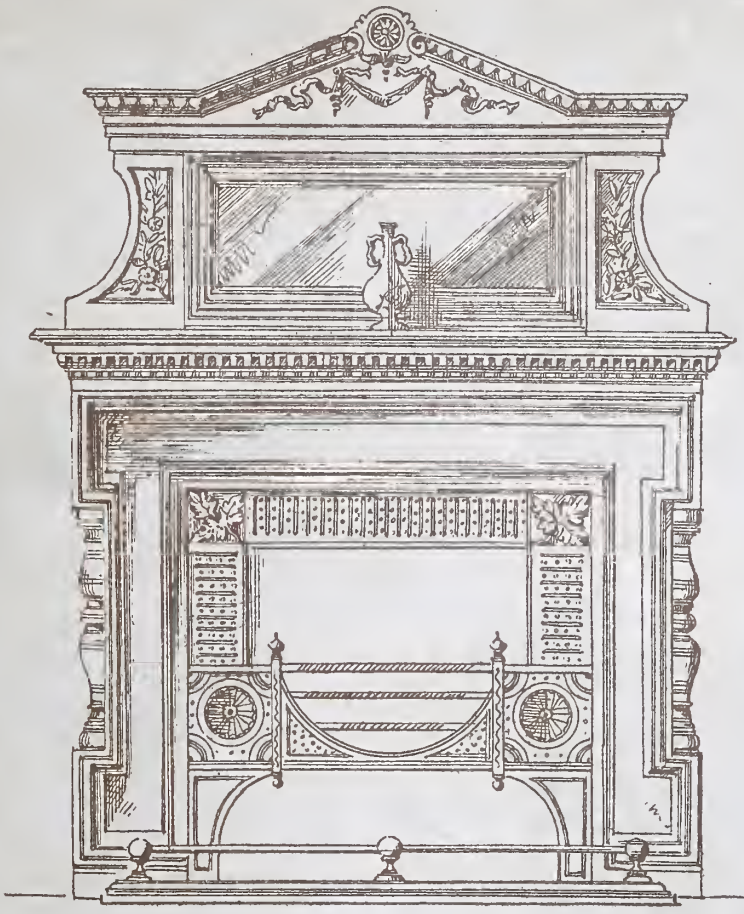
Band Saws vs. Circular Saws.—The German industrial papers are discussing the question of the disadvantages of circular saws as compared with band saws: 1st. Circular saws are very dangerous to the workmen. 2d. They require much greater power to drive them than any other kind. 3d. They make a much wider cut, producing more waste, and thus fewer products from a given amount of material. The only advantage is that the cost of procuring a circular saw is less than that of a band saw; but notwithstanding, the Mechanics' Association (*Gewerbverein*), of Muehlhausen, have already published in their yearly report the advice to abolish their use wherever it is practically possible to do so; and this is of course the case in the great majority of circumstances.

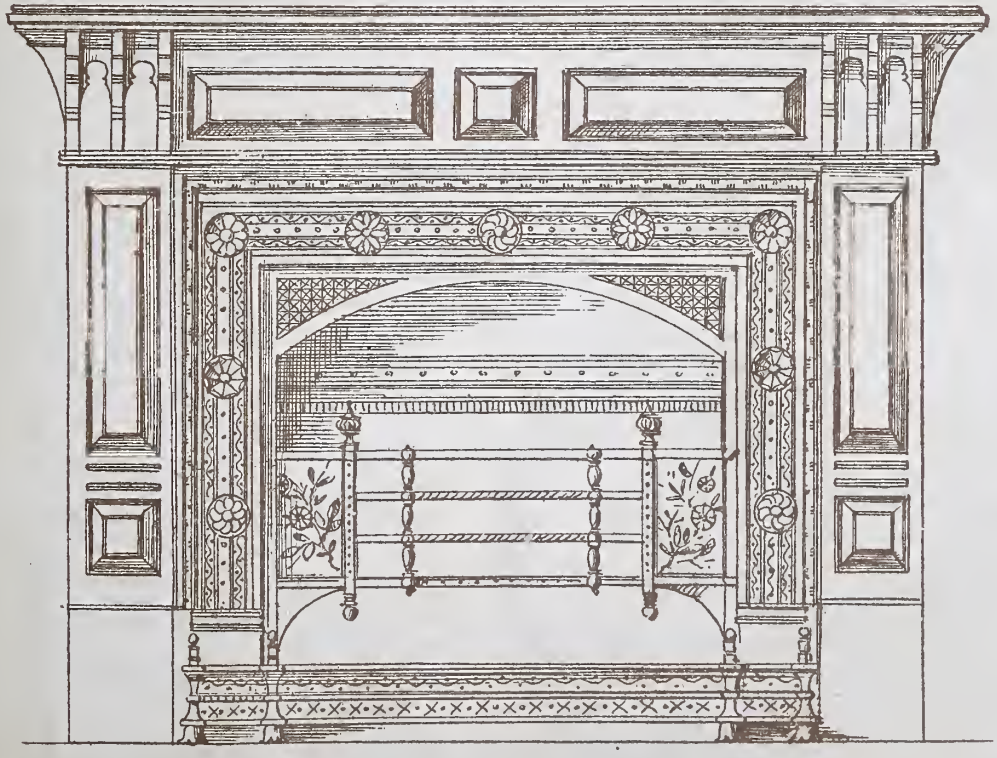
The American Institute Fair.—Those who have not had an opportunity of visiting the fair this season should do so at once if they can. So far, we believe, the fair has been quite a success, financially, and the exhibits are nearly, if not quite, up to the usual standard. E. E. Garvin & Co. exhibit quite a number of machinists' tools, and the Delamater Steam Pump Co. have an excellent showing of hot-air engines, and their celebrated pump. A number of boilers are also shown. The Terra Cotta Lumber Co. also have a fair exhibit, and the Flushing Lumber and Building Co. exhibit a two-story portable house, with two rooms on the first floor—a living room and kitchen, and above two bedrooms of moderate dimensions. The Encaustic Tile Company have a fine exhibition of their manufactures, and one that attracts considerable attention. There is also a very fine exhibit of decorative faience, art, tiles, barbotine, mantel facings, and other decorative materials, furnished by Brownell & Co, N. Y. This exhibit is worthy of close inspection by all lovers of art, more particularly so in this case as the work is by American artists. Take it altogether, the exhibits this year are very creditable.

United States Pension Office.—A new fire-proof building for the United States Pension Office is being erected at Washing-


Designed & Sketched by Edward Dewson Boston.
DOG-ROSE AND BLACKBERRY BLOSSOM.
FREE WILL SERIES
The Builder and Wood Worker.
DECORATIVE SUGGESTIONS

PLATE No. 95

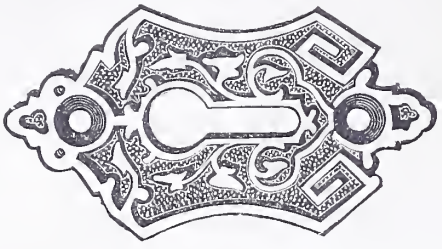




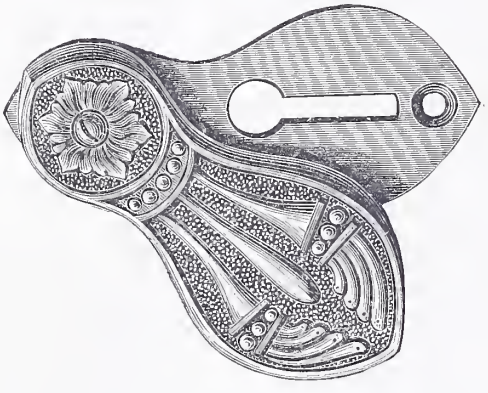
Designs for Mantels, by Bruce J. Talbert.

ton, D. C., under the able supervision of General M C. Meigs. The building is to be of brick and metal. Its dimensions are to be four hundred by two hundred feet, with the outer walls seventy-five feet to top of cornice. We shall look forward to the completion of this building with considerable interest, as from the well-known ability of the directing spirit we are justified in expecting a building that will be as nearly fire-proof as it is possible to get one.

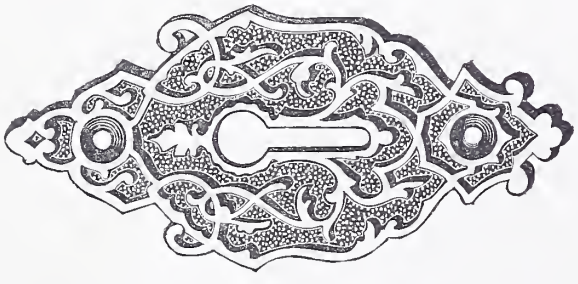
Hemacite Knobs and Escutcheons.—The illustrations shown herewith represent door-knobs and escutcheons manufactured by the Dibble Manufacturing Co. of Trenton, N. J.



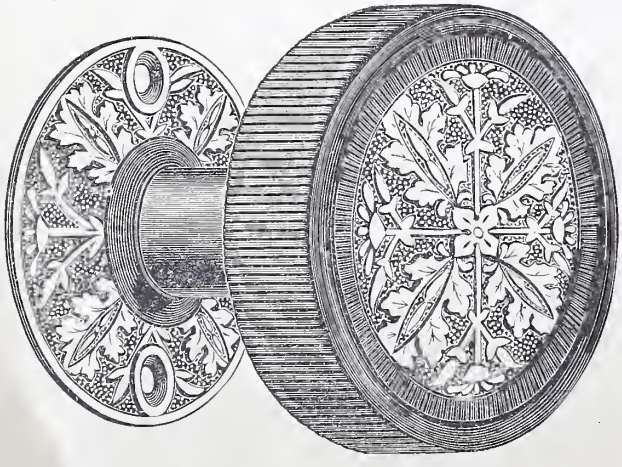
Samples of these goods may be seen at this office, and we are satisfied that, after a fair examination of them, no workman will



recommend any of the mineral or porcelain trash that is so generally used in the cheaper class of houses. We have hammered and



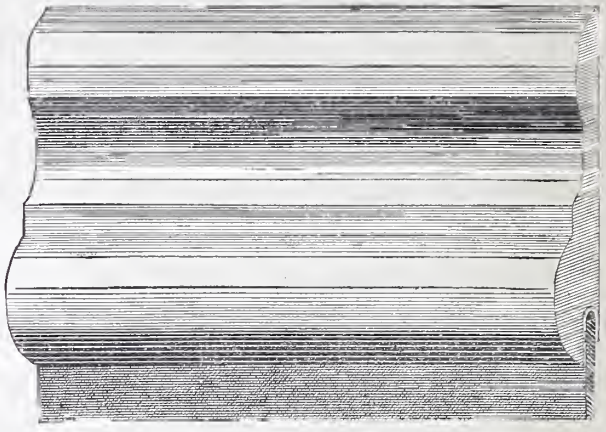
battered at the samples sent us until we were tired, yet failed to break or otherwise damage them to any extent. Not only are



they strong and capable of standing hard usage, but they are actually handsome and in good taste, which is something that cannot be said of the old-time mineral and porcelain door furnishings.

Browne's Metallic Weather-Strips.—These strips are made of vulcanized rubber, the quality of which for yielding and adapting itself to unequal surfaces is well known—bound with zinc (not wood), to hold the yielding substance firmly in its place. They are particularly applicable in situations where the adjacent surfaces to the apertures to be closed are at right angles to each other.

Very few people have any idea of the amount of fuel wasted in heating houses that are too thoroughly "ventilated" for comfort. In time, the best constructed houses become uncomfortable in cold weather, from the shrinkage of the doors and windows. Fresh air is highly desirable, and very necessay to health, but people generally choose to regulate the admission of the same to suit their own tastes; and have no fancy for piercing drafts and arrowy



rushes of cold air creeping up the back, or blowing never so gently down their necks. Insidious streams of air rushing through every unguarded crack or crevice are so many agents of death, and in delicate constitutions very often sow the seeds of disease which end fatally. To obviate the many evils arising from shrunken doors and windows, and to economize fuel, which becomes so expensive when it is most needed, these invaluable weather strips and window bands are introduced, and they are warranted to effectually exclude dust, air, moisture, light, heat, cold, rain, etc., from the crevices or apertatures of the tops, sides, centres or bottoms of doors, windows and skylights, without interfering with their free use for ventilating purposes, winter or summer, for five years.

Indeed, we know of no weather strip in the market that is nearly as good as the one under consideration.

Free Trade *vs.* Protection.—In a paper recently read by N. A. Taylor, of N. & G. Taylor Co., Philadelphia, Pa., before the U. S. Tariff Commission, it was shown that the present duty on tin plate was something enormous, being no less than one and one-tenth cents per pound, and this, too, where there are no manufacturers of "tin plate" in the country to be protected. The tin plate trade of Philadelphia recommends a reduction to three-quarters of a cent per pound.

We have received from the Traveler's Insurance Company, of Hartford, Conn., a very handsome plate containing excellent likenesses of the most prominent newspaper men in the United States. The pictures are shown in the centers of their several newspapers. James Gordon Bennet, being in the *Herald*, C. Dana, being in the *Sun*. But the most interesting at this moment is the very fine likeness of the late Thurlow Weed. The plate is worth preserving as a memento, and thanks are due the Insurance Company, for fastening on paper the features of so many prominent men

Reviews of Trade Literature.

Grimshaw on Saws. A Supplement.—E. Claxton & Co., 930 Market street, Philadelphia, Pa. Price $2.00.

No doubt many of our readers will remember the substance of what we said in 1880, when speaking of Mr. Grimshaw's former effort on the subject of saws. We cannot do better than reiterate, in a measure what was said then in favor of the book, to which the one now under notice is a supplement. Indeed, those who possess the original work, will not be fully equipped until they secure a copy of the supplement, which is uniform in size, style and binding, and

From the German of Erwin Anches, Frederick Keppy, Publisher. Price, $2.50.

This is a good honest work in every respect, and we have reason to believe, is thoroughly reliable. We know of no better book in the language, on the subjects it discusses. It gives detailed descriptions of the raw materials and the apparatus and receipts for the preparation of varnishes and lacquers, and a number of excellent methods for preparing stains for wood, leather, bone, ivory and other materials. For varnish makers this book is indispensable, and must prove a valuable aid to painters and wood-finishers. The chemist, too, will find many things between its covers that will be interesting, and in some cases, instructive. We can heartily recommend this work to those who have anything to do with varnish, stains, or wood finishing.

How to be Weather-Wise. A New View of Our Weather System. With Illustrations. By ISAAC P. NOYES. 12mo, pp. 51, price 25 cents. Fowler & Wells, Publishers, 753 Broadway New York.

This is a little pamphlet written with an apparant intention of explaining the causes of changes of the weather, based upon the system of the United States Signal Service. One object of the author is to show how the data are obtained for making the "daily indications."

The Lake Shore Series. By Oliver Optic. We do not know of any books in the market that we would sooner recommend for light, pleasant and healthful reading, than the Oliver Optic series, published by Lee & Shepard, Boston, Mass. Boys will read, and this is often the making of them, and parents should see to it that the proper reading is supplied to them, and of a kind that is pleasing and suitable to their peculiar organizations. Their books should have life in them, neither too vicious nor too tame; this series just fills the bill, and for a Christmas present cannot be excelled, and we hope many a boy will receive the series in full during the coming holidays.

"Sylvie's Betrothed."—Madame Greville's new book, just published by T. B. Peterson & Brothers, Philadelphia, is full of an inexpressible charm. Its dainty grace reminds us of "Dosia," while it is far loftier in aim and with much more of a plot. Having two heroines—a young and willful girl and a married woman—a wider field is offered for such contrasts in character as are peculiarly the forte of the author. The sympathies of the reader are deeply excited, and it is difficult to say which we find most interesting—Sylvie and her caprices, her gradual development from a girl to a woman, or the fascinating Madame Clermont, who "suffers and is strong." We heartily recommend it to our readers, as not only interesting and delightful, but as a very successful study of French society. As a translation it is excellent and we can find no better words of praise than those employed by Mr. Richard Grant White in a review of another of Mrs. Sherwood's translations: "English is admirable, and such as we almost never see in such literary work." The price of the book bound in cloth is seventy-five cents.

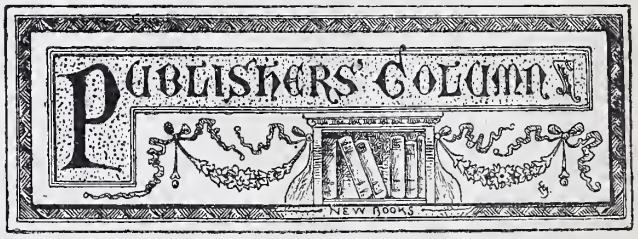
The Elements of Forestry, designed to afford information concerning the planting and care of Forest Trees for Ornament or Profit, and giving suggestions upon the creation and care of Woodlands, with the view of securing the greatest benefit for the longest time, particularly adapted to the wants and conditions of the United States. By Franklin B. Hough, Ph. D., Chief of Forestry U. S. Department of Agrieulture. Robert Clarke and Co., Cincinnati, Ohio. Price $2.

This is a most praiseworthy effort on the part of the author to remove some of the difficulties of timber growers, and to encourge a taste for tree-eulture. The book has been wanted a long time by those who have watched the wholesale destruction and lamented the vandalism of unscrupulous lumbermen, and it will be welcomed by thousands who wish to care for and protect the trees they may have left to them. To those who wish to plant trees, the book will be invaluable, as the instructions it contains are complete and in the main reliable.

The illustrations, of which there are many, add very much to the worth of the book, as they show in unmistakable characters the insect enemies of the different kinds of trees, thus enabling the cultivator to destroy them before they destroy the trees.

Besides giving information on tree culture, qualities of timber, particulars of species, legal matters concerning timber, etc., many other very interesting and instructive items are set forth, among which is the following: "The coloring of autumnal leaves appears to be due to the formation of organic acids from the absorption of oxygen, and caused by a ripening process, similar to that which colors ripening fruits. It is not the effect of frost, as many people believe, but may be hastened by the cool nights alternating with warm days, that often occur in autumn. The autumnal coloring of European forests is sometimes bright, but never as brilliant as in our Northern States and Canada. Its prevailing collors are yellow, shading off into tints of pale orange and reddish brown, while in our Northern forests it is often the brightest scarlet and orange, a rich golden yellow, or an intense purple, but all passing gradually into a nearly uniform shade of brown."

The following heading of Chapters will give an idea of the scope and value of the work: CHAP. I. Definitions; II. Of Soils and their preparation, Effects of Slope and Aspect; III. Of Climate and Meteorological Influences; IV. Reproduction from Seed; V. Of the various modes of Propagation of Forest Trees; VI. Planting Continued; VII. Of the Structure and Functions of the various parts of Growing Trees; VIII. General views in regard to Forestry; IX. Acts of Congress relating to Timber-Rights; X. European Plans of Forest Management; XI. Ornamental Planting; XII. Hedges, Screens, and Shelter-Belts; XIII. Cutting and Seasoning of Wood; Defects in Timber; XIV. Fuel, Charcoal, Wood-Gas; XV. Forest Fires; XVI. Protection from other Injuries than Fire; XVII. Insect Ravages in Woodlands; XVIII. Processes for Increasing the Durability of Timber, or for Improving its Quality; XIX. Resinous and other Products of Conifers; XX. Use of Wood in the Manufacture of Paper; XXI. Tanning Matcrials; XXII. Description of Particular Species; XXIII. The Conifers; XXIV. Tree-Planting in Kansas and Nebraska.



One of the household words among people who take stock in recent evolutions of sanitary science, is A. G. Myer's Sanitary Depot, a card of which appears elsewhere. Everything necessary to plumbing is to be found here, and many of the specialties of this house are of the highest merit. Mr. Myers himself, as an expert, was consulted in the recent overhauling of the White House, Washington, the shocking condition of which was made public during the illness of the late President Garfield, and the authorities now seem to be agreed that the improvements effected could not be bettered.

We call attention to the card on the last page of this issue, of the Accident Insurance Company of North America. Mr. W. A. Armstrong, the General Agent in this city, will be happy to furnish inquirers with the fullest details relative to the advantages it offers.

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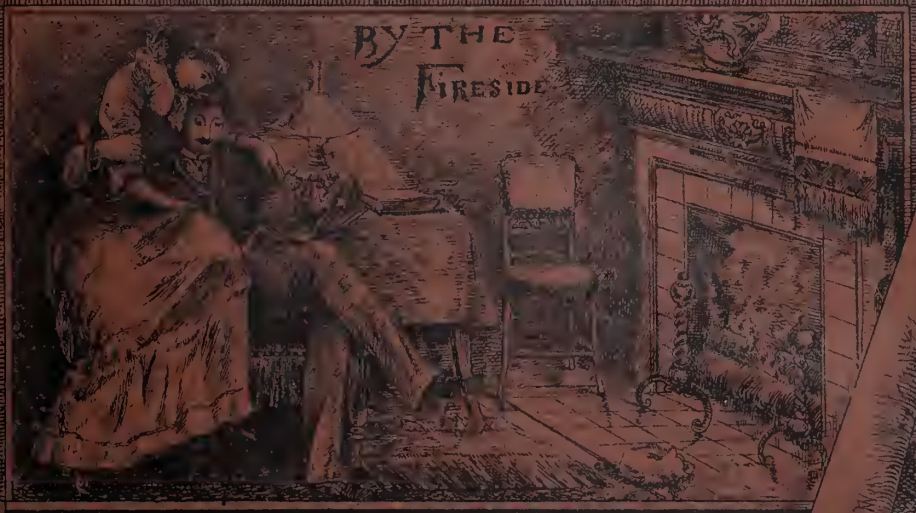

THE BUILDER & WOOD WORK

HOLIDAY NUMBER

A merry Xmas greeting
To all here;
And a happy new year
Another year.

DECEMBER 18??

CHAS D. LAKEY. PUBLISH
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THE CENTURY AND ST. NICHOLAS.

A LITTLE MORE THAN A YEAR AGO the magazine which is now known as THE CENTURY passed a critical point in its history. Three important things happened to it: a change in its own name, a change in the name of the corporation publishing it, and the death of the editor-in-chief, Dr. J. G. Holland. Probably no such combination of circumstances had ever come to any periodical, and people watched with no little interest to see what would be the result. The change in name began with the November (1881) number, and the death of Dr. Holland came just before its issue. By reason of the great excellence of this number and its broad popular features, its sale reached 137,500 copies—the average edition during the preceding twelve months having been 120,000. The following number, December, was a memorial issue to President Garfield and Dr. Holland; its sale was almost as great, and the increased demand has largely continued through the year. The November (1882) number, just issued, has an edition of 140,000 copies. The reasons of this growth are various; but they may be, for the most part, ascribed to the fact that the resources of literature and art have been constantly augmenting and that a gradual improvement has been going on, which has resulted in the issue of what the *Providence Journal*, speaking of THE CENTURY MAGAZINE, calls "the most able and valuable publication ever put forth in magazine form." Among its special features for 1883: "The History of Life in the Thirteen Colonies," a series of separate papers by Dr. Edward Eggleston, just begun, to be richly and accurately illustrated, is alone worth the subscription price. Washington Gladden's realistic serial, entitled "The Christian League of Connecticut," is attracting wide attention among business men interested in Christian work. Henry James, Jr., Alphonse Daudet, Mrs. Frances Hodgson Burnett, Charles Dudley Warner, "H. H.," Geo. W. Cable, E. V. Smalley, Thomas Hughes, Edmund W Gosse, John Burroughs, H. H. Boyesen, Professor Lounsbury, Joel Chandler Harris ("Uncle Remus"), T. W. Higginson and Frank R. Stockton are among its contributors, and from them and other distinguished writers will come the material for another brilliant year of THE CENTURY. Mr. W. D. Howell's new novel, "A Woman's Reason," begins in the February number. The *N. Y. Nation* pronounces THE CENTURY "perhaps

THE MOST JUDICIOUSLY EDITED MAGAZINE IN THE WORLD."

There is another magazine published by THE CENTURY CO., which in the field of children's literature occupies the same place that THE CENTURY fills in the grown-up world. It is ST. NICHOLAS, now just beginning its tenth year, a magazine of which the *London Times* said a year ago. "It is above anything *we* produce in the same line." It is a theory of the editor, Mrs. Mary Mapes Dodge, that there is nothing too good for children, and the boys and girls who read ST. NICHOLAS are really getting the very best writings and the finest pictures that can be had. Its circulation is world-wide. In England, where it has had a large monthly sale for several years, six copies are said to be taken in the household of the Prince of Wales. The Queen of Italy reads it every month to her children. A book was recently issued in the Arabic language, and printed at Beirut, Syria, made up of poems and stories translated from ST. NICHOLAS, enriched with the original pictures loaned by the publishers for that purpose. This year the magazine is to have a serial story by J. T. Trowbridge, one of the most popular writers for boys in the world, and another by Frank R. Stockton —a historical novelette of boy and girl life in the thirteenth century—which the *Springfield Republican* has already predicted "will prove easily the best story of the year for the young." ST. NICHOLAS contains eighty or more pages every month, with from fifty to a hundred pictures.

THE CENTURY costs $4.00 a year, and ST. NICHOLAS $3.00. Special offers are made to new subscribers to THE CENTURY, beginning with November, by which they can have the twelve numbers of the preceding magazine for $2.00. New yearly subscribers to ST. NICHOLAS, beginning with "the wonderful Christmas number" (December), can have November number free, and thus begin the volume. For further information, and a handsomely illustrated 24 page pamphlet describing the magazines and their new home (sent free to persons mentioning this paper), address the publishers,

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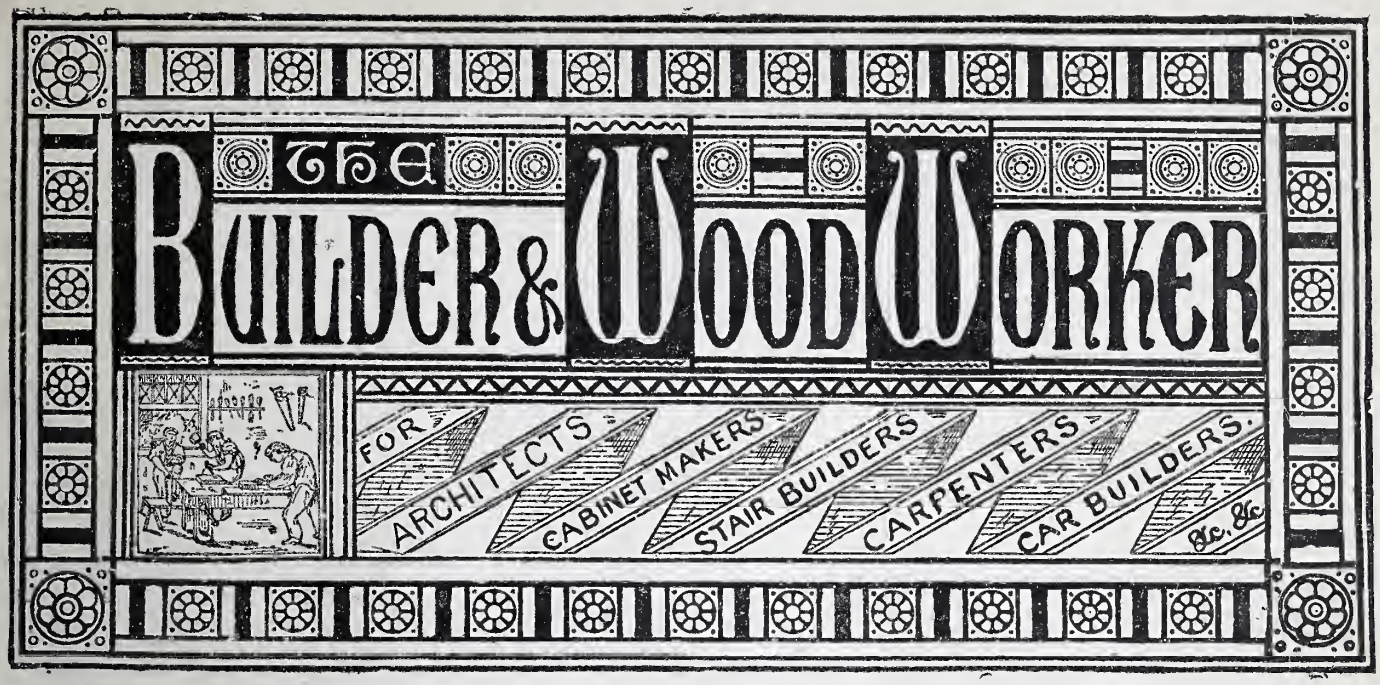

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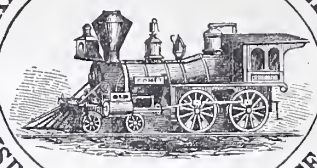

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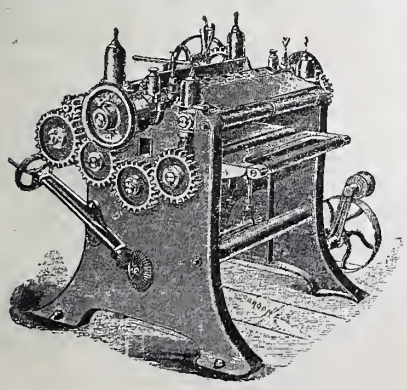

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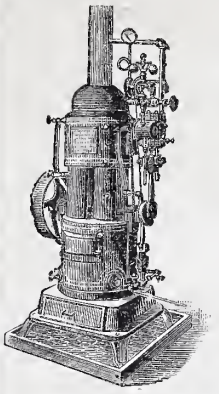

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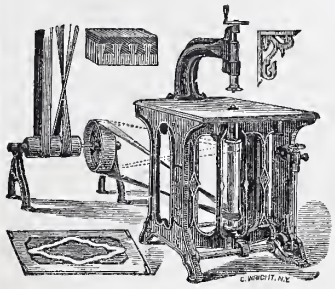

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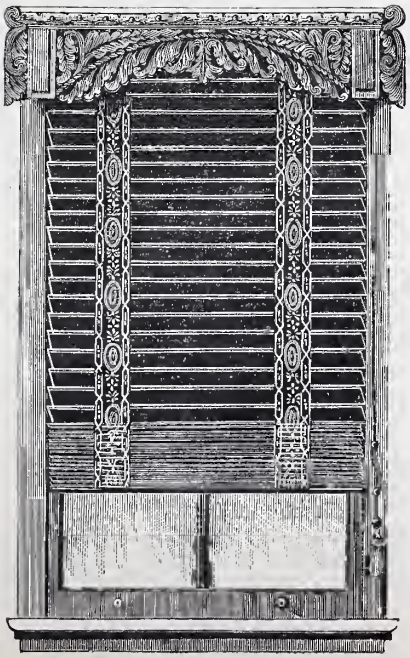

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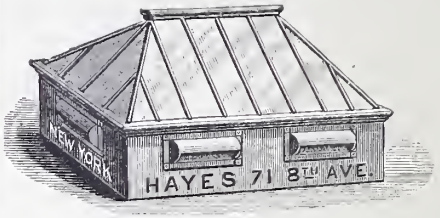

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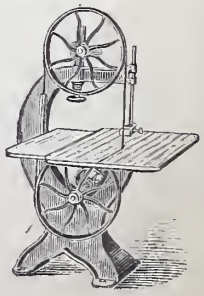

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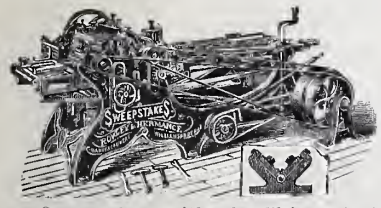

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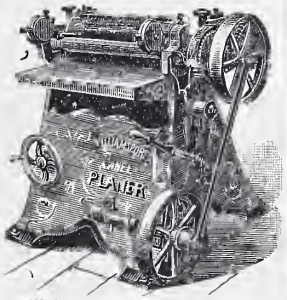

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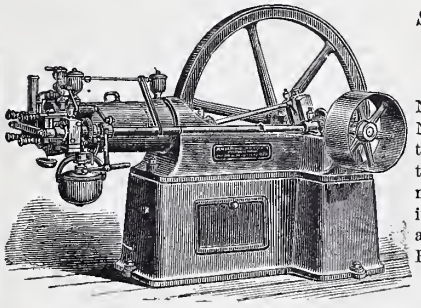

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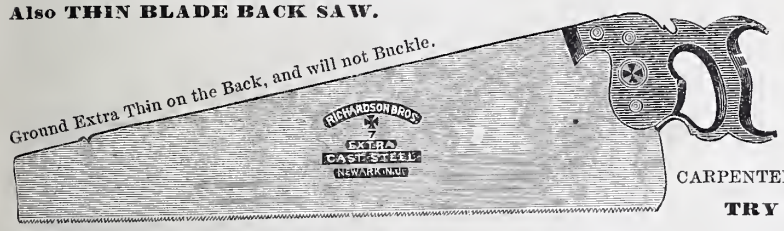

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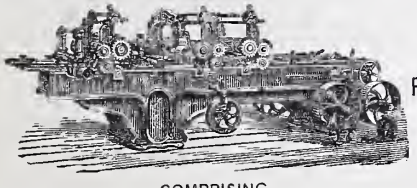

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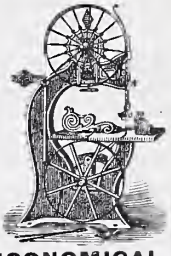

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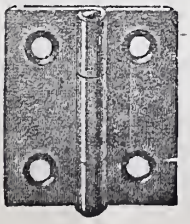

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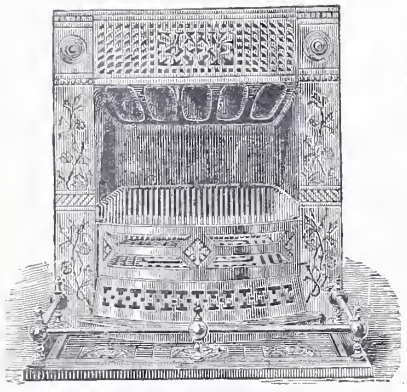

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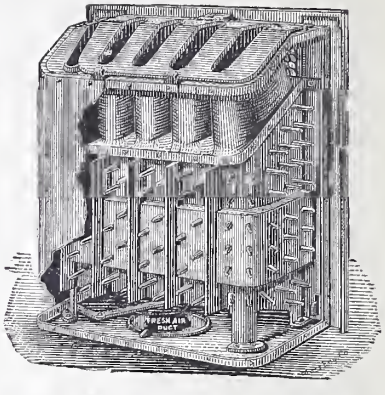

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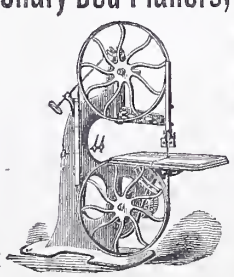

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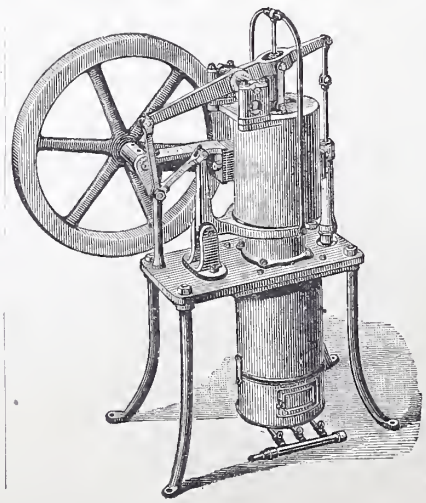

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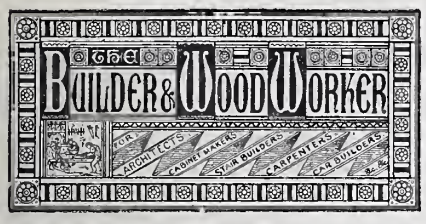

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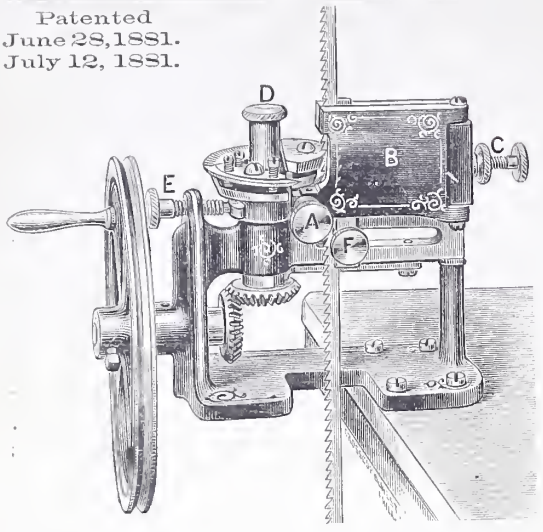

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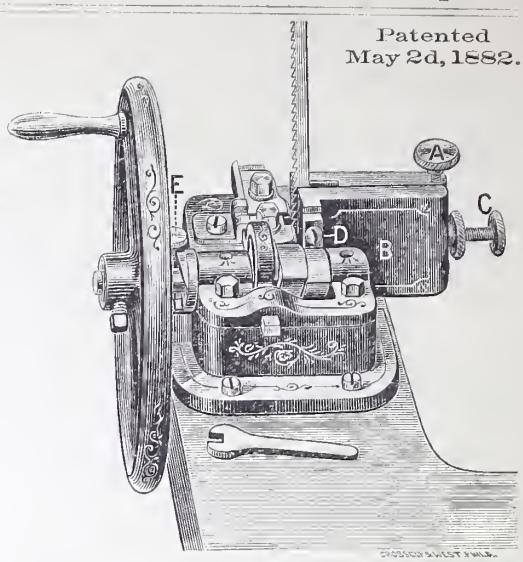

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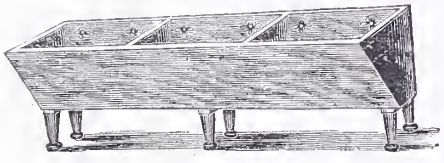

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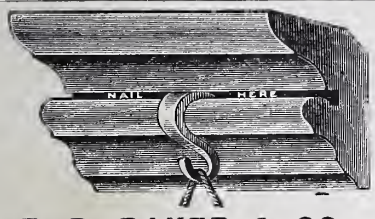

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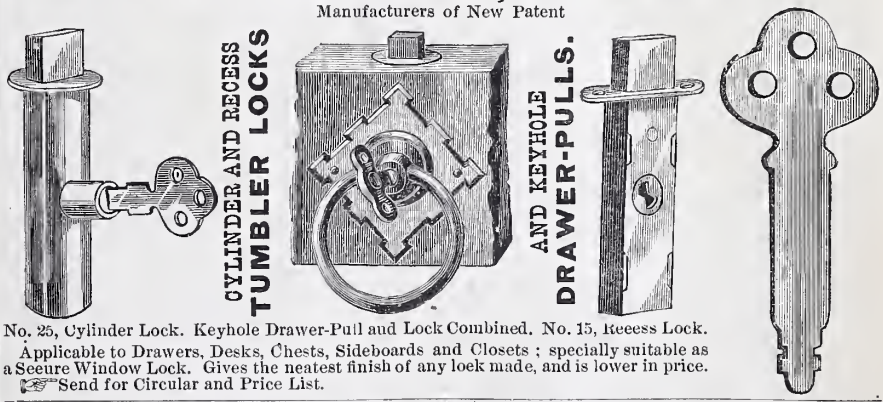

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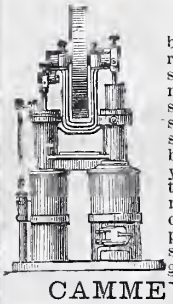

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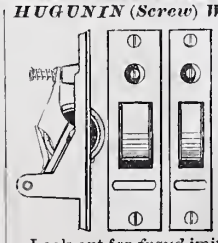

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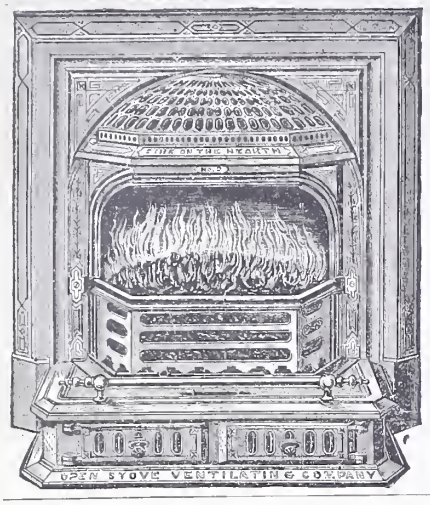

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Surplus by Connecticut Standard,	3,387,571 98
Surplus by New York Standard, about	6,500,000 00
Death Claims paid since organization,	38,528,031 35
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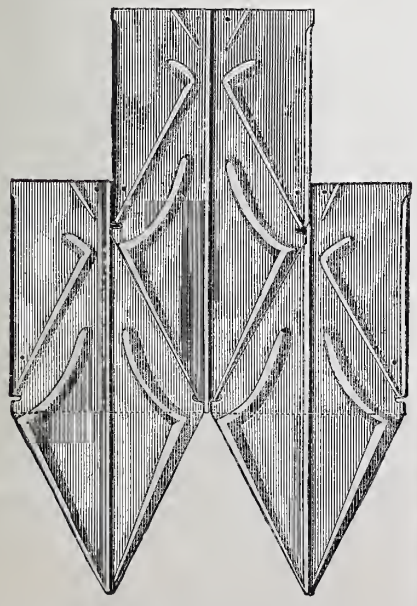

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Reserve for Re-Insurance,	1,943,733 00
Reserve for Unpaid Losses and all other Claims,	245,595 36
Net Surplus,	1,806,180 90
TOTAL ASSETS,	$6,995,509 26

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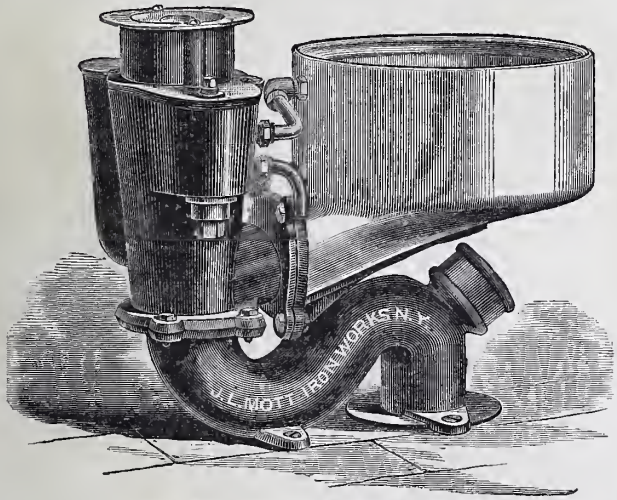

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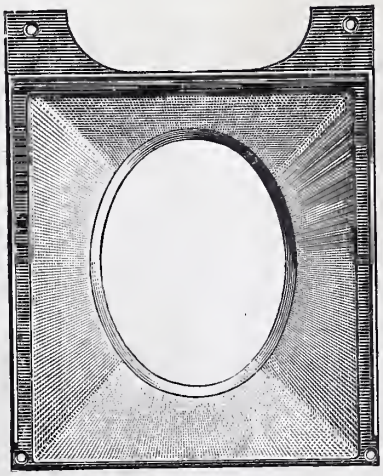

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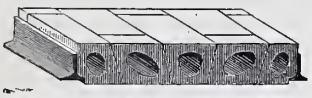

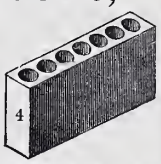

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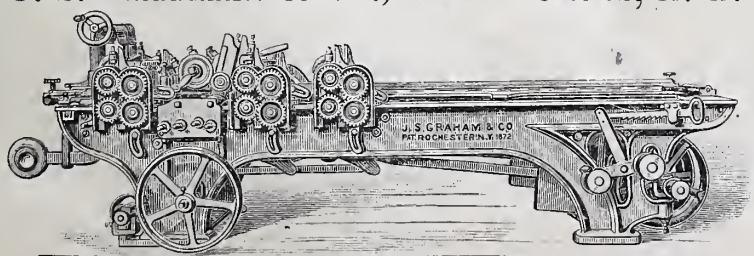

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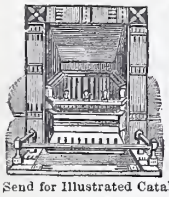

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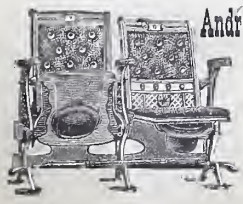

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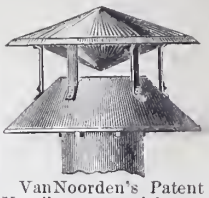

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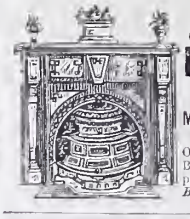

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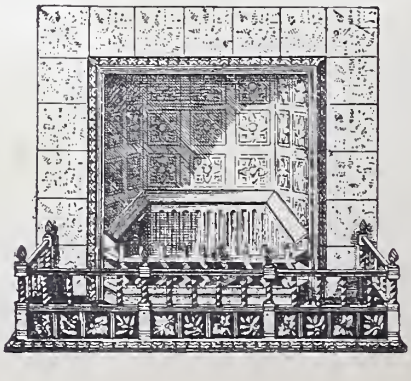

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3. **"Judith;"** a tale of "Old Virginia," by **Marion Harland**

4. **"There Was Once a Man,"** a novel on [illegible] subject, by **"Orpheus C. Kerr."** The author has devoted much care during [illegible] has published in making [illegible] elaborate work. It is full [illegible] and subtle humor.

5. **"Too Late,"** a tender and pathetic story, by **Elizabeth Stuart Phelps.**

6. **"Ops Cas,"** a story of the early Christians, by **Nathan Kouns.**

7. **Harriet Beecher Stowe** will publish a [illegible] early number of OUR CONTINENT.

8. **E. P. Roe** is writing a story for publication [illegible] time.

9. **Rhoda Broughton,** author of "Red as a Rose is She," "Cometh Up as a Flower," etc., will [illegible] a novel shortly

10. **Rev. William M. Baker** has in prepa[illegible] for its latest novel, a sequel to his celebra[illegible] "If It's Not Myself."

11. **H. H. Boyesen** and others are engaged to [illegible] stories for the coming year.

12. **Anthony Trollope's** latest novel, "Land Leaguers," in the preparation of which he has spent the Summer in Ireland, will appear at once.

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